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# EUROPEAN TELECOMMUNICATIONS: PATHWAYS TO THE FUTURE

Brendan Ross


March 1995




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# PREFACE

This paper is the product of my summer internship at IDA during which I supported a task related to pricing telecommunications. Primarily, the paper discusses the technological and infrastructural developments in telecommunications that will make interconnectivity and pan-European connectivity a reality in the coming decade. In addition, it discusses regulation, with a focus on the tremendous effect that political wrangling and maneuvering have on the implementation of new technology. While the paper provides an overview of the latest in technology, it conveys clearly the interconnectedness of politics, economics, and technology.

# CONTENTS


I. Introduction ..... I-1

II. Technology and Infrastructure ..... II-1

A. Fiber and the Infobahn ..... II-2

1. Network Digitization ..... II-2

2. Fiber-Optic Networks ..... II-5

3. Growth in Demand ..... II-7

4. The Infobahn ..... II-11

B. Wireless Communication ..... II-13

1. Wireless Voice Communication ..... II-13

2. Wireless Data Communication ..... II-20

3. Satellite Communication ..... II-23

C. Eastern Europe ..... II-26

III. Regulation ..... III-1

A. Regulation of the Marketplace ..... III-1

B. International Trade Regulation ..... III-6

C. Intellectual Property Rights and Trade in Telecommunications Equipment ..... III-12

IV. Conclusion ..... IV-1

## TABLES


II-1 Comparison of Phone Costs in Four European Countries ..... II-6

II-2 Comparison of Five Countries' Telecommunications Markets ..... II-12

II-3 World Cellular Population Tops 35 Million ..... II-14

II-4 Delays in Service ..... II-15

II-5 UK Cellular Telephone Tariffs ..... II-21


## FIGURES


II-1 Configuration of an Intelligent Network ..... II-3

II-2 The Falling Cost of Telephone Calls ..... II-8

II-3 Subscriber Distribution ..... II-17

II-4 GSM Tariffs: Total Annual Cost Plus Tax ..... II-19

II-5 EGA Screen Dump of Route Map Encoded by Differential Chain Coding Into 1200 byte Message ..... II-22

II-6 Iridium System Overview ..... II-25

II-7 Telephone Main Lines Per 100 Inhabitants as of January 1, 1991 ..... II-27

III-1 The Top Players in Overseas Calls ..... III-10

III-2 Development of Standards: The Release Approach ..... III-13

# I. INTRODUCTION

In the new world order, information is power. As the global communications network expands around the globe, governments discover that economic and political options such as isolationism and border controls become moot. The products of technology are impersonal, but their effects are social, global, and profound. Information—whether it is columns of numbers that can elevate or wreck the world's economies, journalistic reports of genocide in an abstract and distant land, or simply entertainment for our amusement—propels development today as the steel and steam of the last century once did. The uneven growth of our world, with its enormous contrasts of rich and poor, are paraded before us in live news coverage of events a hemisphere away. The new technologies that enable instantaneous access to 100 countries or 1000 Disney titles hold great promise for the world's technological stragglers, some of which exist only across a border drawn arbitrarily in 1945. Global ties between nations stabilize governments; civil war will not be tolerated by manufacturers and investors.

To understand the future, we must closely examine and comprehend the path through history that Western nations have followed. The unique and dynamic structure of Europe—a network of states once at odds, now laboriously drawing together—can provide tremendous insight into our global collective future. Europe, divided culturally and economically into East and West, is a stage—an experiment—for cooperation in communication. Western European politics, governed by the conflict between sovereign nations and the burgeoning pan-European government, serves as a backdrop to technical and cultural issues of unity that require settlement as an antecedent to further progress. The United States is witness and participant in these events, which will inevitably affect the entire world. A parallel can be drawn between the negotiations among the Member States of the European Union and between the members of world bodies such as GATT and the United Nations. Issues of standards and interconnectivity are often settled in a de facto fashion by countries with initiative who establish a dominant technology as a standard, providing a critical mass of commercial interest that will then propel global acceptance of the technology. A united Europe represents a powerful global commercial force, but a divided and squabbling Europe does not. The results of ongoing negotiations and the resident potential for cooperation in the arena of information and communication

technology will serve to either enervate or invigorate the establishment of a global communications network and the leveling of world economies.

This paper focuses first on the technological and infrastructural developments that will make pan-European interconnectivity a reality in the coming decade. New fiber-optic, wireless, and satellite technology, as well as the burgeoning and much-vaunted information superhighway, will all contribute to the increasing sophistication and simplicity of voice, video, and data communications. A short subsection on recent development in Eastern Europe will explore the thesis that increased communication and increased stability spiral upwards together. The intent throughout this part of the paper is to inform the reader of actual and planned infrastructural accomplishments and future trends in telecommunications.

The second half of the paper deals with the sticky subject of regulation. Its purpose is to inform the reader of the tremendous effect that political wrangling and the directed actions of interested parties such as unions, regulators, legislators, and business executives have on the implementation of new technology. Specifically, it discusses marketplace regulation, trade regulation, and the debate between the need for standards and the rights of intellectual property holders.

The paper does not address privacy and communications security. Both are important issues that will need to be dealt with by the governments and corporations involved in networking Euorope, but are too complex to be addressed adequately in a paper of this scope.

It is hoped that the reader will finish this paper better informed not only of the latest in technology but also of the interconnectedness of politics, economics, and technology and the profound effects, as evidenced in Europe, that action in one sphere can have on the entire world.

# II. TECHNOLOGY AND INFRASTRUCTURE

Changing technology begets change in infrastructure. The rapid pace of technological change—the introduction of fiber optics, digital switching, affordable wireless, advanced computers—has necessitated an equally rapid evolution of network systems. But because resources are finite, governments have had to prioritize investment and search for ways to spur economic growth. Governments of the Western nations, whose economies increasingly rely on information and intelligence, have recognized that a wealth of information and a growing economy and ease of communication can be a strong impetus for economic growth. Hence, government policy in recent years has focused on improving the telecommunications infrastructure. Failures of the past have made governments reluctant to participate directly in construction or operation of new telecommunications ventures. Instead, governments are learning to rely on intelligent regulation to guide and channel private industry to tasks profitable for businesses and consumers.

This section summarizes the latest changes that are occurring in European government and industry. While regulation specifically is the focus of a later section, it is certainly true that regulatory liberalization has supplied as great an impetus for infrastructural changes and technological advancements as research and development has. Thus, liberalization and politics are discussed as factors in Western Europe's telecommunications destiny. This section does not attempt to explain in any detail the operational and engineering specifics of the forthcoming technologies. Instead it attempts to give an overview of the most current projects under consideration, with an eye towards informing the reader of trends and future possibilities. Many of the sources in this section are recent newspaper articles rather than academic journals. Indeed, much of what has been written can be considered "common knowledge" and is not footnoted at all. While journals are extremely useful as a tool for gaining perspective, their ponderous publication schedule quickly dates them, making them unacceptable sources for revealing current trends.

Although the convergence of technology is itself an important trend, this section has been divided into subsections for clarity. The first, Fiber and the Infobahn, deals with the growth of fiber networks, the convergence of cable and telephony, and the burgeoning and

much-vaunted information superhighway. The second subsection, Wireless Communication, concerns itself with the cellular and PCS technology in Europe and with the latest satellite communication plans. The last subsection details prospects for Eastern Europe, a land of promised opportunity that remains extremely backward.

## A. FIBER AND THE INFOBAHN

Network digitization, the pervasive use of optical fiber, and the growth of demand and variety of services are the propelling forces in telecommunications.[1] Each of these is discussed in turn, followed by a section on the Information Superhighway, to make clear the current direction and capability of wired networks and information technology.

### 1. Network Digitization

Network digitization is a broad term that subsumes the introduction and evolution of Intelligent Networks, advances in information transfer technology, and the growing global compatibility of telecommunications. The Intelligent Network (IN) is based on the principle that a separation of the command layer from the execution layer will result in simpler turnover of new command sequences and service execution updates.[2] A limited number of command nodes will house the so-called intelligent features, and execution will be carried out by the normal digital exchanges (see Figure II-1).[3] The introduction of INs, driven essentially by market demand for new services, should expedite introduction of a number of new services in the very near future.

Because of the massive economies of scale, especially in interconnection, IN network rollout in Europe will likely be in accordance with International Telecommunication Organization (ITO) guidelines, although the standard is expected to be modified by the European Telecommunications Standards Institute (ETSI) to better fit the European environment.[4] The features of this first international stage of IN evolution will include Freephone (allows subscribers to receive calls at multiple locations), Universal Personal Telecommunications (advanced Freephone which assigns subscribers a single universal telephone number accessible across all networks), and Virtual Private Networks (which provide the subscriber, say some company, with private network capabilities using

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1 Cesare Mossotto, "Pathways for Telecommunications: A European Outlook," *IEEE Communications Magazine*, August 1993, p. 55.

2 Ibid., p 56.

3 Ibid.

4 Ibid., p 35.

public network equipment, thus eliminating the need for private investment in dedicated network resources.[5] The security of these virtual networks is a serious issue.) It is worth noting that Bellcore, the research group of the Baby Bells, is investigating IN possibilities with compatibility to ITO standards, as is the Telecommunications Technology Committee, the standards body in Japan.[6] In the UK, which since its local infrastructural deregulation and attendant competition a decade ago has been a leader in every aspect of telecommunication, British Telecom, the privatized ex-PTT,[7] currently supports Freephone and VPN.[8] The world can expect the UK to be both a leader and a testing ground for the very newest in IN technology and programming.

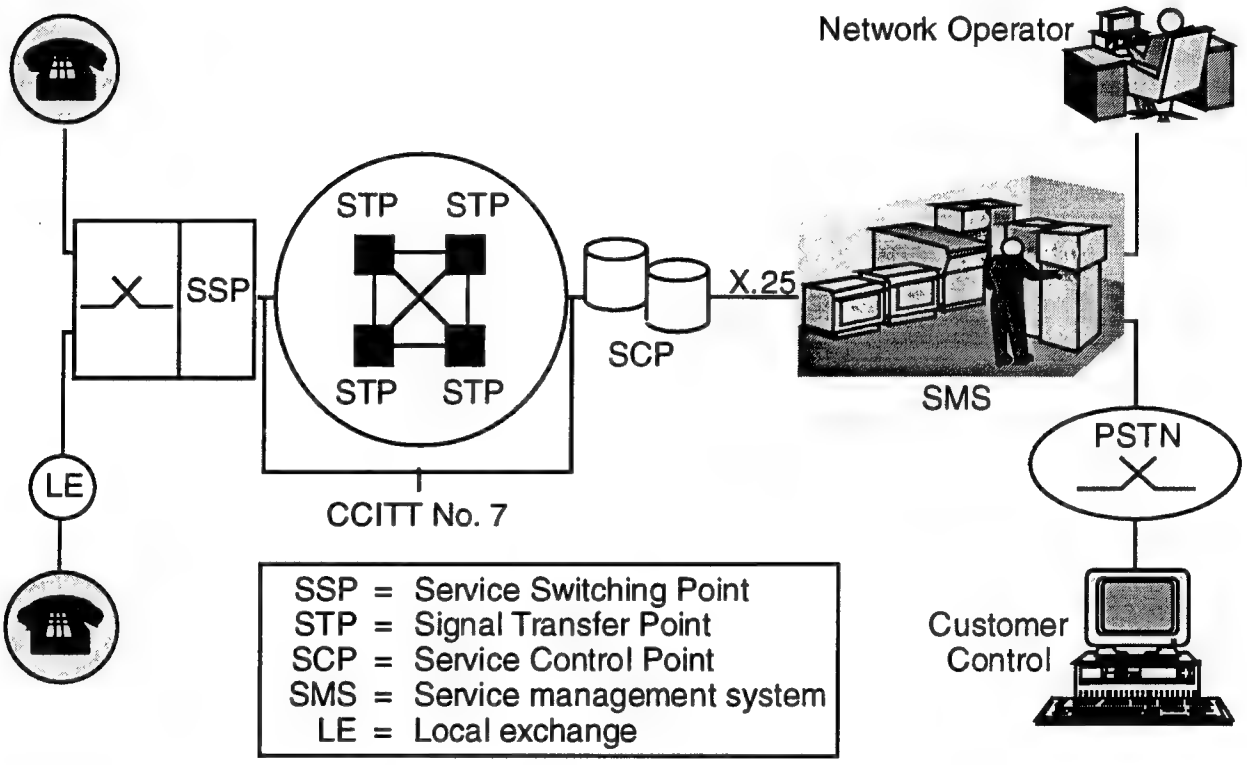


**Figure II-1. Configuration of an Intelligent Network**

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5 Ibid., p 32.

6 Ibid., p 35.

7 Post, Telegraph, and Telecommunications monopoly that typically (in Europe) operated all communications networks for a particular country. Generally, "PTT" is used to refer to the original monopoly provider for a particular country, whatever the actual name of the company.

8 Emillio Cancer, Ron McCann, and Marc Aboudharam, "IN Rollout in Europe," *IEEE Communications Magazine*, March 1993, p. 42.

Responsibility for the future range of telecommunications possibilities stems from advances in data transfer. Much of future network capacity will be consumed by data and video transfers and even two-way video-conferencing. There are essentially two ways of digitally transferring information, each of which I describe briefly before analyzing current European trends.

Circuit-switched networks create end-to-end circuits that are exclusively used by the sender and receiver. These networks are "blocking"—there is no sharing of circuit capacity for the duration of the communication. Since they are end to end, communication is in real-time and there is no delay in the communication that would affect coordination of voice and video. Typical voice transmission is circuit-switched, real-time, and blocking, because it allows for smooth communication between the two parties. These characteristics will be more clear upon examination of the contrasting method of transmission.

Packet-switched networks are ordinarily used for data transmission. A burst of data, together with address or destination information, is initiated in one location and thrust into the network like freshly logged timber floated downstream. At various switching points the data packet waits its turn before being routed into a line and plunging on. This method is considered non-blocking because an increase in the number of packets simply slows down the rate of packet flow. Of course, packet-switched circuits do not operate in real time, since there is no dedicated connection between sender and receiver. On older packet-switched networks, packets were of various sizes, causing efficiencies in overhead (the number of bits dedicated to addressing and control information), but this could cause delays at switching points because packets entering a switch couldn't be passed through as smoothly; picture cars at a four-way stop sign intersection interrupted by the occasional military convoy. Older X.25 and frame relay protocols allowed for data packets of various sizes,[9] but a new standard is emerging that is based on fairly small (53-byte), uniform cells. This standard is being incorporated into the emerging Asynchronous Transfer Mode (ATM) technology.

ATM is extremely useful for some limited applications, and in fact may be the only way to deliver voice and video in tandem without latency, a noticeable delay in transmission that results in quirky, disjointed voice-video coordination.[10] US Sprint is

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9 For instance, the Defense Data Network limits packet size to 1024 bytes.

10 For a discussion of ATM and its perhaps limited usefulness, see Frank J. Derfler Jr., "ATM: the Emperor's New Clothes," *PC Magazine,* v12, n22, Dec 2, 1993, p. NE1 5,

offering ATM services to business customers now, but it is quite possibly the only US carrier offering ATM so far. Though the EC's RACE[11] program has developed low-cost local loop and ATM switching technology, ATM service is not widely available in Europe.[12] ATM is being used experimentally in Britain's Superjanet academic and research network where the technology is utilized to teach surgery with voice and video at remote sites.[13] ATM may have uses other than video conferencing. The current European digital transmission standard, Integrated Services Digital Network (ISDN), is a circuit-switched technology and may be cost-inefficient for those with lesser capacity requirements. Cost to establish a circuit is far greater, especially when the data is not voluminous, than to insert packets into any type of packet-switched network. Whether or not ATM will be the savior of packet-switched data transfer, it will soon be offered as part of Intelligent Network rollout throughout Europe and the world.

### 2. Fiber-Optic Networks

Current fiber deployment in most of Europe, with the exception of super high capacity backbones, is still relatively scarce. Experiments are underway in most countries, however, to determine the cost feasibility and the demand for fiber networks of various types. A number of factors including uncertainty over installation costs, unknown demand-push for newer services, and the tangle of European regulations, are all negatively affecting deployment of fiber.[14] Still, there is a confidence in the demand and usefulness of fiber, as evidenced not only by the EC's RACE[15] programs on fiber but also by private industry investment in fiber R&D. Deutsche Telekom spent about DM 1 billion, or 1.7% of its total turnover, on R&D with the intention of establishing a Europe-wide fiber network.[16] Deutsche Telekom has concluded that the number of switching centers can be reduced if fiber replaces copper, resulting in important costs savings.[17]

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11 Research and Development in Advanced Communications Technologies in Europe

12 Augusto A. de Alburquerque, AJN Houghton, and Steffen Malmros, "Field Trials for Fiber Access in the EC," *IEEE Communications Magazine,* v32, n2, Feb, 94, p 40. This article provides an excellent overview of the status of fiber in the EU, and part of the article is included in the apendices of this paper.

13 George Black, "Multimedia Spurs ATM Advance," *Financial Times,* May 31, 1994, p. VI.

14 de Alburquesque, p. 46.

15 Research and Development in Advanced Communications Technologies in Europe.

16 "Conference Report: The Reaity Gap in European Telecommunications," *Telecommunications Policy,* May/Jun, 1993, p. 313.

17 de Alburquerque, p. 47.

The state of fiber is far more advanced in some parts of Europe than others. The UK already has extensive fiber networks. Fiber connections to large businesses for telephone and data services have been available for some time, though FTTC (fiber to the curb) and FTTH (fiber to the home) are not generally used by British Telecom for basic voice telephony. Cable companies, many of which will compete with British Telecom for voice customers as well as supply entertainment, are using FTTC almost exclusively. In fact, as a general rule, cable companies are usually responsible for the introduction of fiber to local communities. Generally, if cable TV penetration is high, then use of fiber for all types of communication is high. Perhaps this is because, though infrastructural competition is illegal in Europe (with the exceptions of the UK and Sweden), portents of future competition, including the successes of the UK and Sweden, are highly visible, and telephone companies want to be ready to take on cable operators in the future market for one-stop communication shopping.

A further generalization on fiber and telecommunications is in order. The greater the extent to which the PTT has a monopoly on communication, the more expensive, the less universal, the more delay-ridden and inefficient, and the less advanced (less digital, less features) that communication system will be. This is especially obvious in Italy (see Table II-1), where the Prime Minister owns the major broadcasters and hence has little interest in the entry of cable; in Spain, where Telefonica is massive and unprivatized, and cable TV penetration is almost nil; and in Greece, unprivatized and still relying on mechanical switching to some degree.[18]

**Table II-1. Comparison of Phone Costs in Four European Countries**

(Equivalent 1994 UK£)

| | Average Cost per Line* | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| UK-Mercury | 1,837 | 1,814 | 1,724 | 1,644 | 1,520 | 1,456 | 1,480 |
| UK- BT | 2,209 | 2,177 | 2,106 | 1,977 | 1,688 | 1,601 | 1,625 |
| France | 2,686 | 2,149 | 2,103 | 2,057 | 2,039 | 1,984 | 1,771 |
| Germany | 2,588 | 2,597 | 2,335 | 2,104 | 2,065 | 1,943 | 1,938 |
| Italy | 3,555 | 3,539 | 3,386 | 3,140 | 2,903 | 2,794 | 2,609 |

*Figures based on tariffs in force on January 31 of each year. Data source: *Analysis*

18 Natasha Constantlou, "Liberalizing telecommunications markets: Political externalities in the Greek case," *Telecommunications Policy,* August 1993, pp. 436, 438.

### 3. Growth in Demand

Growth in demand for a variety of services has been a result of changing market strategies that have roots in the exploding importance of communications, information, and intelligence for businesses and, to a degree, consumers. This section highlights a number of trends that have appeared over the last two years or so and continue to affect the structure of communications in Europe and the world.[19]

Financial centers are intense zones of competition for telecommunications providers. The concentration of firms with massive information demands and the ease of infrastructure installation disposes big cities to be the engines of telecommunications competition and innovation. Indeed, a recent report by the London Business school indicates that more concentration is likely in financial centers.[20] This report contradicts much conventional wisdom which has held that information technology will promote telecommuting and the electronic exchange of information, and thus lessen concentration. The trends discovered by the report do not apply to all firms, however. British Telecom has found that conversion to new technology will necessitate a 50% downsizing by 1998; accompanying layoffs will be new offices located in outer London and more flexible work schedules including tele-commuting.[21] For financial firms, though, and bigger information-dependent businesses, the center of the city will remain the busiest and most sought-after location.

Competition is generated in urban areas from new competitive access providers, firms that wire up a building or buildings and then bypass the local network, running lines right to a long distance provider. However, competition in infrastructure is not yet allowed anywhere in Europe except the UK and Sweden, where competition has resulted in benefits such as reduced tariffs (see Figure II-2), widened product choice, improved service quality, and multiple-sourcing.[22] Multiple-sourcing is a new trend that derives from the growing awareness among information and network managers in private companies that resilience, the ability to avoid network mishaps and downtime, is crucial to business success. Most bigger London businesses have at least two telecommunications

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19 For more in depth information get a reprint of the survey, "Telecommunications in Business," *Financial Times,* July 15, 1994. The "survey" contains 18 news analysis pieces that cover current trends in all aspects of telecommunications for businesses.

20 Jenny Ireland, "The Importance of Telecommunications to London as an International Financial Centre," Corporation of London, Guildhall, London, EC2P, 2EJ.

21 Vanessa Houlder, "BT's big Sell-Off," *Financial Times,* Jun 17, 1994, p. 11.

22 Ireland.

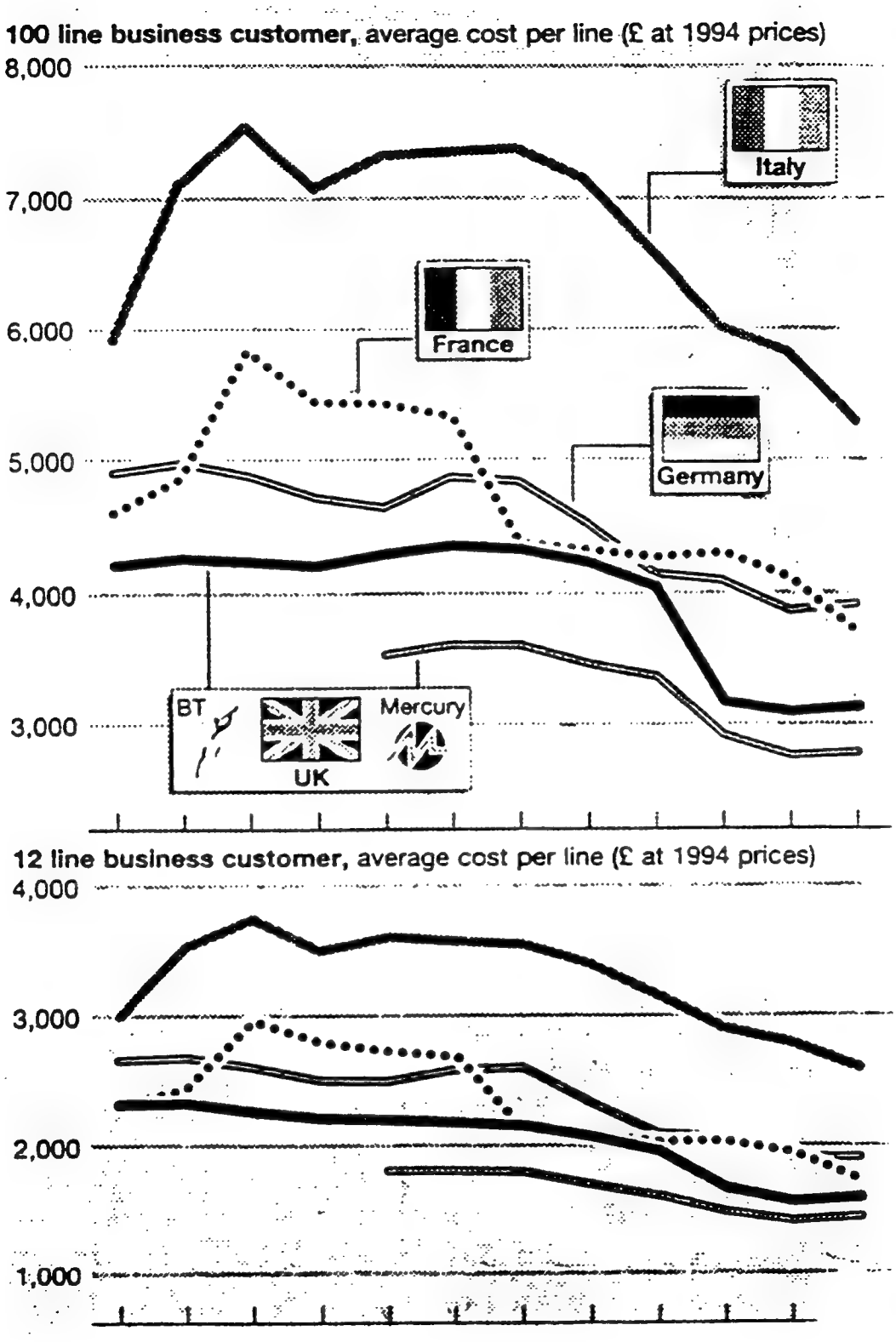


**Figure II-2. The Falling Cost of Telephone Calls**

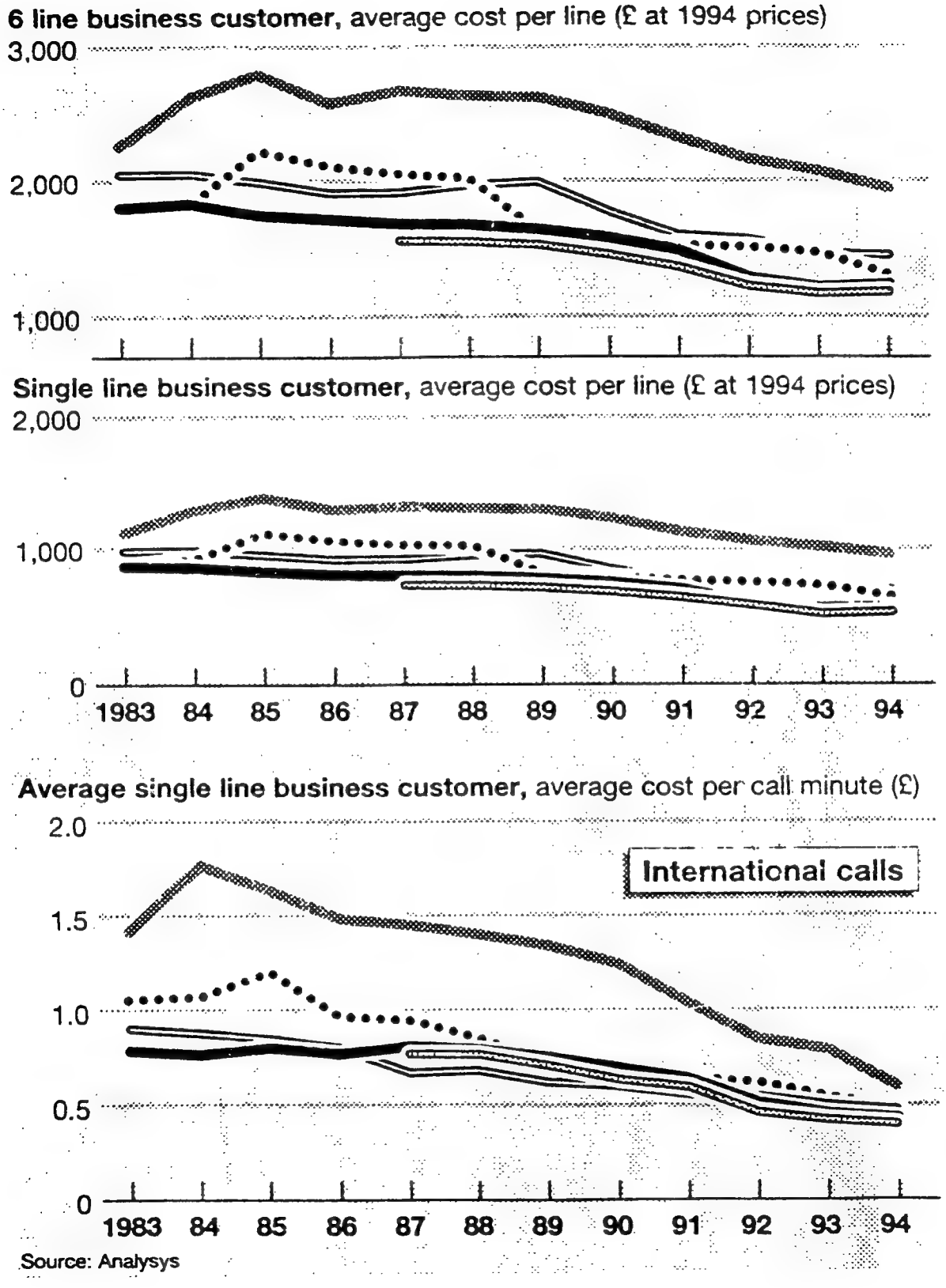


**Figure II-2. The Falling Cost of Telephone Calls (Cont'd.)**

suppliers, so that the failure of one network simply shifts the burden to the other network, and the firm is not cut off from the outside.

All of these trends have been gleaned from the current situation in either London or New York. As noted above, there are no competitive access providers (as of February 1994) in any parts of Europe besides the UK and Sweden. However, that does not dull the potency of these trends. The appearance of massive contracts for private business networks, such the European Virtual Private Network Users Association, in which a private phone company leases access from the PTT and sets up a virtual network between private companies, their suppliers, and their clients, will likely be followed by a push for EC policy allowing genuinely independent infrastructure.[23] Such a policy would allow the void in continental European cities to be filled by hundreds of ready and willing competitive access providers.

Another important trend is the recent move by companies large and small to outsource telecommunications and data-processing requirements to another company. The company, expert in billing, installation and maintenance of network, and effective use of computer resources, effectively takes over those departments in the client company. The Financial Network Association, with members including public telephone operators from Europe and the world, plans to offer such services to large multinationals that could save them 40% on cross border telephone bills. Interestingly, the 40% savings will come directly out of the state telecommunications provider's own pockets, since they will own both the national networks that are losing the wasteful and cost-inflated business and the partnership that will provide outsourcing savings. Why do they do this? To compete with other virtual networks such as Swift, initially set up by a group of international banks to manage their telecommunications needs and beginning to offer its services commercially.[24] Mergers and alliances such as Concert, begun by MCI and British Telecom, and the proposed Sprint-France Telecom-Deutsche Telekom alliance are all after the multinational corporate market said to be worth $10 billion.[25] Unisource, a consortium of the PTTs from the Netherlands, Sweden, and Switzerland (and to a limited degree, Telefonica of Spain), has teamed up with AT&T to provide the same types of multinational corporate

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23 Richard L. Hudson, "European Companies Speed Shift to Phone Competition," *Wall Street Journal,* June 24, 1994, p. B4.

24 Andrew Adonis, "Wind Blows Both Ways", survey: "Telecommunications in Business," *Financial Times*, Jun 15, 1994.

25 John Keller, "Sprint is Said to be Seeking Global Alliance," *Wall Street Journal*, Jun 3, 1994, pp. A3, A4.

telecommunications services.[26] Much of the latest telecommunications news is information on the various alliances that are taking place as companies scramble to position themselves for liberalization in telecommunications.

Electronic Data Interchange (EDI), basically electronic document transfer, is being adopted by more businesses that are attracted to the cost-cutting and time-saving features such a system has to offer. IBM and Geis[27] are the most popular providers of the service in Europe, and their cross-continental networks are being adopted by larger companies which are then requiring their suppliers and clients to subscribe as well.[28] Although a number of different protocols exist, entering EDI supplier firms are adopting the Edifact standard which permits transmission of all types of documents, not simply ordering and invoicing, making growth in this area inevitable.

### 4. The Infobahn

Coined by *Wired* magazine, the term "Infobahn" describes the vast worldwide network of on-line computer systems, including especially those connected to the loosely organized Internet. Connection to the Internet requires a host computer, and most users rely on a commercial host since becoming a host oneself is economical only for the heaviest users. To date, there is no commercial on-line host service in Europe that compares to CompuServe or America Online. This is one limiter of the number of European Infobahners. The other limiter is the lack of access to computers. Whereas 42% of Americans have access to a computer, only about 16% of Europeans own or can use such a device (see Table II-2).[29] In addition, messy regulation makes cross-border data transfer tough and expensive. This may soon change, however, as a number of European business concerns plan to jointly introduce Europe Online, a commercial online slated to accommodate English, French, and German and scheduled to be available by spring 1995.[30]

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26 John Keller, "Sprint Confirms It's in Talks with Firms in France, Germany on Big Investments," *Wall Street Journal,* Jun 8, 1994, pp. A2, A9.

27 General Electric Information Serivces.

28 Paul Taylor, "Route to Paper-Free Trading, survey: Telecommunications in Business," *Financial Times,* Jun 15, 1994, p. VII.

29 Gautam Naik, "European Partners Plan On-Line Link for the Continent," *Wall Street Journal,* June 3, 1994, p. B8.

30 Ibid.

**Table II-2. Comparison of Five Countries' Telecommunications Markets**

(All figures as of 1993)

| Country | Daily TV Viewing (hours) | Multiple TVs (% homes) | VCR (% homes) | Cable & Satellite TV (% homes) | Basic Cable Fee per Month (US $) |
|---|---|---|---|---|---|
| France | 2.9 | 35 | 52 | 5 | $22 to 25 |
| Germany | 2.3 | 20 | 58 | 39 | 5 to 13.50 |
| Italy | 3.3 | 31 | 31 | 0 | NA |
| UK | 3.5 | 50 | 67 | 17 | 14 to 22 |
| US | 3.7 | 65 | 82 | 65 | 17 to 22 |

| Country | PC Penetration (% Homes)[a] | CD-ROM Units Installed | Laptop, Notebook, Palmtop Units Sold |
|---|---|---|---|
| France | 8 | 100,000 | 380,000 |
| Germany | 12 | 220,000 | 510,000 |
| Italy | 6 | 183,000 | 196,000 |
| UK | 12 | 185,000 | 595,000 |
| US | 28 | 7,500,000 | 4,100,000 |

| Country | Cost of bandwidth[b] | Networked PCs (%)[c] | Local phone charges (cents)[d] |
|---|---|---|---|
| France | $17,255 | 62 | 42 |
| Germany | 11,699 | 58 | 36 |
| Italy | 21,879 | 41 | 38 |
| UK | 4,733 | 67 | 69 |
| US | 1,746 | 69 | 13[e] |

Sources: *Inteco Corp.; Dataquest; Tarifica/OmniCom PPI Ltd.; Lehman Brothers; S.G. Warburg.*

[a]Intel-based IBM compatibles and Apple. [b]2 megabits per second sent 180 miles along digital leased line. [c]Percent of PCs used in business hooked into local area networks. [d]Average 10-minute peak call. [e]Ameritech, for business callers. NA: Not applicable.

The Bangemann Report, a document concerning the present and future of European telecommunications and produced under the auspices of Martin Bangeman, EU Industry Commissioner, was published in July 1994 by the EC. The report made a number of suggestions and especially urged private European companies to take the initiative in establishing a Superhighway.[31] Following this report, the European Multimedia Forum was formed, with an eye towards private institutional formation of the Infobahn, but so far

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31 Alan Cane, "Superhighway push by Europe," *Financial Times,* Jun 27, 1994, p. 17.

little has been accomplished. Without a greater availability of computers, it is unlikely that consumer demand will pull producers into establishing the Information Superhighway. In fact, commercial construction of an information superhighway is currently infeasible because of the European instinct to interfere with entrepreneurial incentives, a phenomenon that devastated the European computer industry in the 1970s and 1980s,[32] and the continued state-owned telecommunications monopolies that inflate prices and suppress consumer desire to "reach out and touch" anyone via computer.

## B. WIRELESS COMMUNICATION

Advanced digital wireless communication, held back in the United States by the weight of an immense analog cellular infrastructure, is entering Europe forcefully and may transform the way businesses communicate. More and more workers find themselves out in the field, incommunicado, for at least part of their business week. These workers are turning by the millions to wireless communication (see Table II-3), and the increased demand has brought a large number of players to the wireless field, reducing prices for equipment and subscription charges. Wireless has caught on quickly and vigorously in Europe for a number of reasons: the need for flexible support of end users, the low cost of adding subscribers to the network, the well-conceived and coordinated acceptance of the GSM standard in Europe, the lack (in many countries) of PTT monopoly rights in wireless, and the PTT induced overpricing of wired services.

This section is divided into subsections that correspond to three natural divisions in wireless communications. The first subsection, Wireless Voice Communication, covers the aforementioned reasons for the popularity of wireless and a description of the various types of wireless networks and their promise. The second subsection, Wireless Data Communication, covers the relative lack of success and the promise of wireless data transmission, and the third subsection will describe the elaborate but, to date, unrealized plans for the next generation of satellite communications networks.

### 1. Wireless Voice Communication

Choice has always driven the burgeoning and successful wireless communications market. Consumers and businesses want choice in network organization, choice in communication options, and a healthy variety of phone services. Choice generally stems from competition; monopolies do not often have the incentive to provide a substantial

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[32] Peter Fuhrman, "Here We Go Again," *Forbes*, June 6, 1994, p. 98.

**Table II-3. World Cellular Population Tops 35 Million**

| Date | Number of Subscribers (in millions) | | |
|---|---|---|---|
| | Europe | Rest of the world | World total |
| April 1990 | 2.6 | 5.2 | 7.8 |
| November 1990 | 3.2 | 7.2 | 10.4 |
| April 1991 | 3.9 | 8.8 | 12.7 |
| October 1991 | 4.4 | 9.2 | 13.5 |
| February 1992 | 4.7 | 11.4 | 16.1 |
| January 1993 | 5.8 | 17.0 | 22.8 |
| July 1993 | 7.1 | 20.2 | 27.3 |
| January 1994 | 8.9 | 24.9 | 33.8 |

Source: *Financial Times*
GROWING MARKETS: the world cellular population reached 33.8 million by January 1994, according to the latest issue of the FT Newsletter, "Mobile Communications." However, the figure for western Europe alone rose by a million in the first three months of this year. The cellular population in western Europe grew by 47 percent last year, rising to 8.8 million at the end of 1993.

The North American market grew by 43 percent last year, rising to 17.3 million from 12.1 million. The fastest growing cellular markets are in Asia—China experienced the highest growth-rate, rising by more than 300 percent from 160,000 subscribers at the end of 1992 to 644,000 subscribers a year later. *Details of the FT group's two telecommunications newsletters, "Telecom Markets" and "Mobile Communications," are available in London on tel. 071-353 0305; fax 071-353 0846.*

array of products and services. The PTTs' rights to monopolize wired voice communication until 1998, and their physical infrastructure indefinitely, has led to PTT complacency. PTT management, until very recently, has done little to offer the variety of services[33] Americans have taken for granted for years. In addition, fulfillment of service requests, such as for a new line, can take months (in Italy, Portugal, or Spain) or years (see Table II-4). In Greece, delay of 4.7 years (in 1992) was typical for a telephone connection![34] While these delays are not present in England and France, they nonetheless serve to illustrate the point that monopolists do not serve the public particularly briskly. Perhaps the reasons for relatively greater PTT efforts in France include the introduction of

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33 Such as virtual private networks, call waiting, call forwarding, conference calling, advanced billing services.

34 *European Telecommunications Indicators,* Oct, 1992; also OTE, *Annual Report: Regional Overviews,* Feb, 1992.

competitive wireless networks. These competing networks have the PTTs running scared. Operators of networks have secured permission from the British government for a bypass of the British Telecom's local network, reducing retransmission costs for the wireless companies and their customers.[35] Permission in other countries is not far away, occurring at the latest in 1998. In fact, the EC is expected to use a special provision in the Treaty of Rome to force liberalization of mobile telecommunications networks on intransigent Member States.[36]

**Table II-4. Delays in Service**

| | Waiting List for Main Lines (1991) | Waiting Time in Years for Telephone Connections (from 1992) |
|---|---|---|
| Greece | 1,059,802[a] | 4.7 |
| Spain | 244,167 | 0.3 |
| Portugal | 207,669 | 0.8 |
| Italy | 57,000 | 0.1 |
| UK | 0 | 0 |
| France | 0 | 0 |

Sources: *European Telecommunicaiton Indicators*, October 1992; OTE, February 1992.
Note: The penetration rate camouflages the fact that many subscribers have several telephone lines, while others have none.
[a]February 1991.

Flexible support of end-users and a flexible office environment have made wireless local area networks known as Private Automatic Branch Exchanges (PABX) the choice of a growing number of European businesses. One technology consultant has estimated that 20% of the initial cost of the average PC network is accounted for by configuration—what wires go where.[37] In addition, all the shuffling and rewiring can consume 50% of a network's operating costs over its lifetime.[38] Users of a wireless network can simply take their phones and computer with them as they migrate about the office. The two problems

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35 Peter Haynes, "Scooping the Loop," *Economist,* v329, n7834, Oct 23, 1993, p. T14(3).

36 Article 90 of the Treaty of Rome allows the EC to impose liberalization without the support of the Council of Ministers. It is rarely used—with the exception of telecommunications—because it is undemocratic. As written in: Emma Tucker, "Brussels set to encourage mobile telecom networks," *Financial Times,* July 11, 1994, p. 3.

37 BIS Strategic Decision is the Consultant.

38 Peter Haynes, "New medium, New Message," *Economist,* v329, n7834, Oct 23, 1993, p. T16(3).

holding back the success of wireless local area network—the cost of transmitting devices and the laggard pace of data transfer—are problems that additional technology may soon solve. Already, infrared data transmission is capable of 100,000 bps rates,[39] 25 times the typical modem rate a few years ago.[40] The Dect[41] standard will likely outcompete the older, less versatile CT2[42] standard. The Dect standard was designed for large and heavy use offices with a mix of voice and high speed data transmissions and has been adopted by five of the largest European equipment manufacturers—Alcatel, Ericsson, Nokia, Philips, and Siemens. Ericsson of Sweden recently launched its Freenet system, which adds on to a company's PABX. Three components—a radio exchange, a number of low-powered base stations, and up to 600 cordless handsets—complete the system, which has been installed in factories, hospitals, and 'offices of the future.'[43]

Wireless communication also has an important economic advantage for entering service providers: constant average costs (see Figure II-3). Monopolist firms have long used the declining long-run average cost advantage caused by the horrendous initial expense of digging up roads to lay cable to bolster their monopoly advantage and maintain high profit levels. Wireless receivers do not need burial or protection from rats and the elements, and do not require infrastructural changes that are often retarded by unhelpful monopolists. They cost a flat amount, usually about $1000 per customer. While it is true that this is expensive compared with urban connection costs, it is roughly half of what a new rural subscriber costs the phone company for installation.[44]

Digital development, essentially second generation wireless technology, is racing ahead in Europe because, perversely, of the lack of a first generation wireless presence. EC expert Herbert Ungerer expects Europe to "leapfrog" America as its monopoly markets in local and long distance disintegrate at once.[45] America's immense number of analog network users must be kept happy, a feat which will require analog compatibility with the next generation of digital networks. Fitting analog users to the new global standards will be an unenviable task that Europe will avoid. In fact, though the overall US cellular market

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39 bps = bits per second. Recal that a typical modem might run at 2400 or 9600 bps.

40 Peter Haynes, "New medium, New Message", (supra note 5).

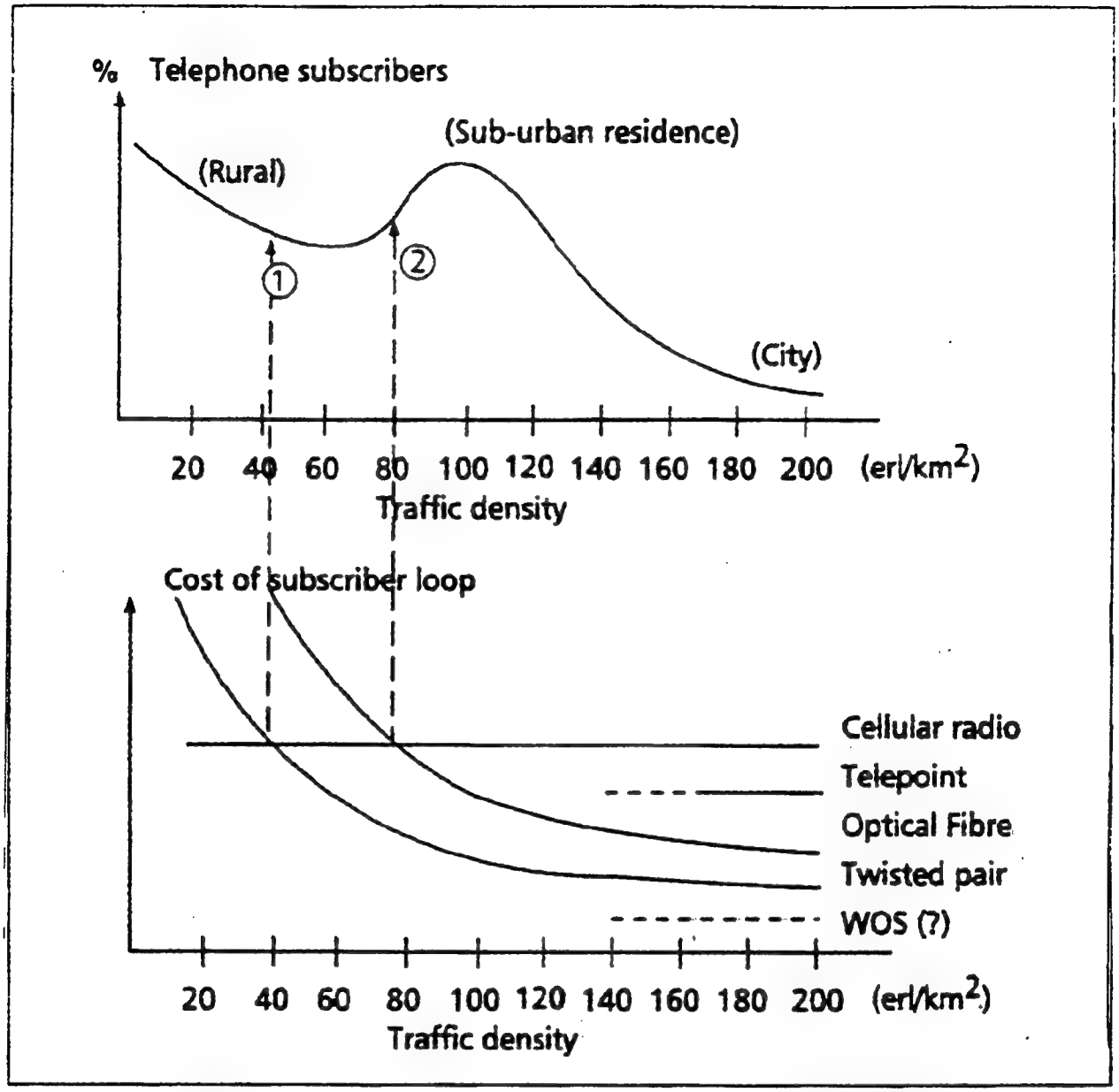
41 Digital European Cordless Telecommunications.

42 Cordless Telephony 2.

43 Paul Taylor, "Ways to Cut Call Failure Rates," *Financial Times,* Telecommuncations in Business (survey), Jun 15, 1994, p. XII.

44 Peter Haynes, "Scooping the Loop."

45 Gail Edmondson, "Brave Old World," *Business Week,* The Information Revolution, (Special '94 bonus issue), p. 42.




*The economy of various access techniques to public telephone network [2]. Above: Subscriber distribution in typical service area, as a function of traffic density. Below: Corresponding costs of different subscriber access techniques. Cross-over points indicate the transition where cellular access techniques are cheaper than: 1) twisted-pair subscriber loop; 2) optical fiber to the home.*

**Figure II-3. Subscriber Distribution**

is nearly double that of Europe—15 million versus 8 million—the number of digital subscribers in Europe vastly outnumbers those in America—1.8 million versus 100,000. And European annual growth in the digital market is 133%. By 2000, there could be 16.2 million digital subscribers in Europe.[46] These numbers are reflected in spectacular European sales growth among wireless equipment manufacturers, and this in turn spurs R&D for more advanced, lighter receivers. Digital network switching systems are dominated by L M Ericsson of Sweden, the company that supplies McCaw Cellular even though McCaw's new parent company, AT&T, also has switches available. The increasing success of wireless in Europe has much to do with the agreed upon digital standard, GSM.

Agreement on GSM, originally known as Group Special Mobile when development began by numerous PTT administrators on a standard that would allow international roaming, is arguably the most important factor in the explosion of European cellular services. Although now it faces the introduction of competition from the new breed of Personal Communications Services (PCS) equipment, GSM—now known as the Global System for Mobile communications—currently dominates Europe and much of the world, with operators in 48 countries formally committed to GSM (see Figure II-4).[47] Seventeen countries in Europe have signed a Memorandum of Understanding that ensures common frequency allocation in the 900-MHz band in all countries.[48] Benefits such as interoperability with the nationally switched public telephone networks, connectivity to all Continental carriers, elimination of need for non-backbone cabled infrastructure, low-cost of introducing service, simple upgrade of network capacity via "cell splitting,"[49] and the ability to locate and bill users from any location are the result of a Continental—and possibly worldwide—standard. The net result is more business for cellular service and equipment supply companies. Naturally this means more jobs, and European governments are excited at the prospect of being world technology leaders for once. The EC is especially pleased since the outcome of its coordination effort is an obvious major success for the aspiring pan-European regulator.

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46 All numbers by consulting firm Yankee Group Europe, as cited in Gail Edmondson, "Wireless Terriers: the Europeans are Seizing a Juicy Lead in Mobile Technology," *Business Week,* n3373, p. 117.

47 Edmondson, p. 42.

48 Jens C. Arnbak, "The European Revolution of Wireless Digital Networks," *IEEE Communications Magazine,* v31, n9, Sept, 93, p. 75.

49 Cellular networks operate on a "cell" basis. A certain number of calls can be handled within a specified boundary area, a cell. To expand capacity, you can simply make cells smaller without changing the number of calls handled per cell.

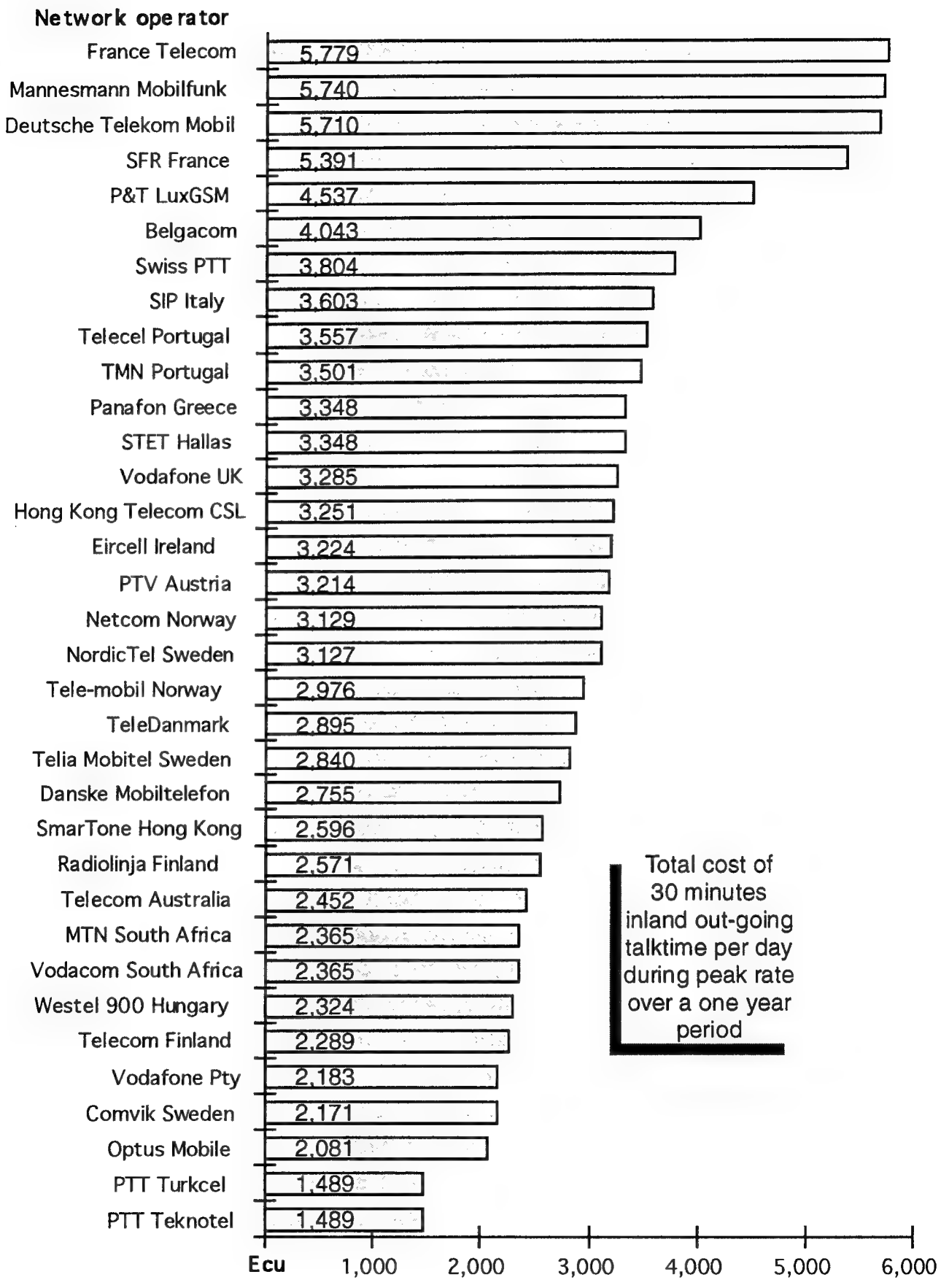


**Figure II-4. GSM Tariffs: Total Annual Cost Plus Tax**

PCS[50] is becoming another option for wireless users. PCS, sometimes known in Europe as PCN, is a new wireless technology that uses lower power and cheaper handsets that could allow deep cost savings. Table II-5 shows that Mercury PLC's One-2-One service in Britain has undercut GSM prices by as much as 50% (note that Mercury One-2-One and Orange are PCS networks, the rest are GSM).[51] While introduction of PCS is stalled in the United States until the FCC's airwave auctions are completed later this year, PCS is up and running on the continent, with networks in competition with GSM in Britain and major cities in Germany.[52] Expansion of a $4.8 billion German system by E-Plus Mobilfunk is to be completed by 1997, and the consortium expects 3.3 million customers by 2000.[53]

Competition from PCS and entering GSM companies is expected to bring down costs, which can be prohibitive for cross-border calls. For instance, a British-based mobile user in Sweden who receives a call from the UK must pay British Telecom's international charge for a call to Sweden. If the cellular user doesn't answer, the call is routed back to the UK to a voice mail account, and the receiver must pay again for the return leg.[54] New programming and IN[55] features will soon eliminate this wastefulness, but cross-border calls will continue to be pricey, at least until more complete liberalization in 1998.

### 2. Wireless Data Communication

As discussed in the earlier section on infrastructure, efficient data transmission requires a packet-switched network. The problem for wireless users who require data transmission is that GSM and PCS are both circuit-switched systems. Although GSM handsets will all include a port for portable fax and notebook computer data transferral, engendering and paying for a source-to-destination circuit is extremely inefficient for typical bursty data transmissions.[56] A packet-switched radio network is what is needed,

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50 Personal Communications Services

51 Edmondson, p. 117.

52 Joia Shillingford, "One the Move, but Still in Touch," *Financial Times,* Jul 12, 1994, p. 11.

53 Edmondson, p. 117.

54 Shillingsford, p. 11.

55 Intelligent Network, as discussed in the previous section.

56 Arnbak, p. 77.

## Table II-5. UK Cellular Telephone Tariffs

(Excluding 17.5 percent VAT)

| Type of Service | Name of Service | Connection (E) | Monthly Rental (E) | Call charges/min.[a,b] Peak (P) | Off-Peak(P) | Peak-time band |
|---|---|---|---|---|---|---|
| VODAPHONE | | | | | | |
| BusinessTacs | Business | 50 | 25 | 25 | 10 | 7:30am-9:30pm Mon-Sat |
| Low-user Tacs | LowCall | 25 | 12.8 | 43 | 17 | 8:00am-7:00pm Mon-Sat |
| London Tacs | Capitalcall | 50 | 20 | 20/50 | 10 | 7:30am-9:30pm Mon-Sat |
| GSM | EuroDigital | 50 | 25 | 25 | 10 | 7:30am-9:30pm Mon-Sat |
| MCN | MetroDigital | 50 | 20 | 20/25/50] 10/12.5] | 10] 5] | 7:30am-9:30pm Mon-Sat |
| CELLNET | | | | | | |
| Business Tacs | Primetime | 50 | 25 | 25 | 10 | 8:00am-10:00pm Mon-Sat |
| Low-user Tacs | Lifetime | 25 | 12.8 | 43 | 17 | 8:00am-7:00pm Mon-Fri |
| London Tacs | Citytime | 50 | 20 | 20/50 | 10 | 8:00am-10:00pm Mon-Sat |
| GSM | GSM | 50 | 25 | 25 | 10 | 8:00am-10:00pm Mon-Sat |
| MERCURY ONE-2-ONE | | | | | | |
| PCN London | BusinessCall | 20 | 20 | 16 | 8 | 7:00am-9:00pm Mon-Fri |
| PCN London | PersonalCall | 20 | 12.5 | 25 | free/10 | 7:00am-7:00pm Mon-Fri |
| ORANGE | | | | | | |
| Orange | Talk 15[c] | 30 | 15 | 25 | 12.5 | 7:00am-7:00pm Mon-Fri |
| Orange | Talk 60[c] | 30 | 25 | 20 | 10 | 7:00am-7:00pm Mon-Fri |
| Orange | Talk 200[c] | 30 | 50 | 18 | 9 | 7:00am-7:00pm Mon-Fri |
| Orange | Talk 360[c] | 30 | 75 | 16 | 8 | 7:00am-7:00pm Mon-Fri |
| Orange | Talk 540[c] | 30 | 100 | 14 | 7 | 7:00am-7:00pm Mon-Fri |

Source: *FT Newsletter - Mobile Communications, May 5, 1994*

[a]Capitalcall and Citytime peak-rate call charges are 20 pence a minute for calls made from within the M25 orbital motorway, and 50 pence a minute for calls from elsewhere. In both cases, off-peak calls cost 10 pence a minute.

[b]MetroDigital peak-rate call charges are 20 pence a minute for local calls and 25 pence a minute for long-distance calls, provided they are made from within a MetroDigital coverage area. In both cases, off-peak calls will cost 10 pence a minute. Calls from outside MetroDigital coverage areas will cost 50 pence a minute at peak times and 10 pence a minute off-peak.
When calls are made from a subscriber's home cell, peak rate charges are 10 pence a minute for local calls and 12.5 pence a minute for long-distance calls. Local and long-distance off-peak calls made from inside the home cell both cost five pence a minute.

[c]Talk 15 includes 15 free minutes of airtime; Talk 60 includes 60 free minutes; likewise, Talk 200 includes 200 free minutes; Talk 360, 360 free minutes; Talk 540, 540 free minutes.

and many companies do supply such services. For instance, a small map of the United States could be encoded efficiently with 1200 bytes (see Figure II-5).[57] Transmission of that map on a packet-switched system would require the equivalent of half a second in a 19.2 kbs data channel. Imagine the time, and the cost, it would require to fax that image. Clearly the packet-switched network provides a healthy cost advantage. So far, however, enthusiasm has been minimal for a number of reasons: competition between various technologies dûe to the lack of a standard, price of equipment, excessively complex and expensive applications, lack of market understanding, and a belief that risks outweigh dollar benefits.[58]


**Figure II-5. EGA Screen Dump of Route Map Encoded by Differential Chain Coding Into 1200 byte Message**

First and foremost is the casual data transmitter's reluctance to subscribe to two different networks, one for voice and one for data. This might explain why only 2% to 5% of cellular users transmit data over any type of network.[59] A new technology, developed by McCaw Cellular Communications, may allow for casual data transmitters to utilize their circuit-switched networks. This technology, called Cellular Digital Packet-Switched Data (CDPD), allows users to send data over traditional circuit-switched networks using the "spaces" between voice traffic. This technology is not in use in Europe. Packet-switched networks are available almost everywhere in Europe, under a number of different

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57 For example, using Digital Chain Coding.

58 Research by Ovum market researching group, as cited in: Paul Taylor, "Still a Cinderella Sector," *Financial Times,* Telecommunications in Business (survey), Jun 5, 1994, p. IV.

59 Taylor, "Still a Cinderella...," p. IV.

standards. The most popular among newer and more successful older companies is the Mobitex standard, developed by Ericsson. Although growth has been slow, there is a belief among industry executives that a critical mass of customer interest is being reached, and Ovum market researchers predict growth from 325,000 users now to 9 million by the turn of the century; such growth would represent a $7.6 billion total mobile data market.[60]

### 3. Satellite Communication

The various proposals for new satellite communication systems go far beyond the uses to which satellites have been put to date. Currently, satellite usage has been concentrated in a few relatively obscure areas, and the current market for European satellite services is only just over $200 million.[61] Among the uses for Geo-stationary[62] communication satellites are fixed and mobile telecommunications networks via expensive Vsat (very small aperture) terminals, data and video links across oceans for communication and entertainment, maritime communication systems where land-based systems are not an option, and global positioning and tracking systems for military and commercial customers.[63] New EC rules due to have taken effect in November 1994 will liberalize the satellite communications equipment and services sector, allowing producers to sell products directly to businesses such as Vsat terminals. Liberalization of the consumer market throughout Europe may not occur for some time. In any case, the proposed new satellite communication systems will offer a breadth of commercial services heretofore supplied only either at great expense by Geo-stationary satellites or not at all.

Although high tech entrepreneurs have devised some seven global satellites, market and spectrum limitations are likely to limit the number actually launched to two or three.[64] Most of the planned systems will use Low Earth Orbit Satellites (Leos) that orbit between 400 and 1000 miles above the Earth's surface. This low orbit will result in a mean horizon-to-horizon traversal time of 15 minutes. Because satellite phone users will need a line of sight to a satellite, some companies have rejected Leos technology in favor of a smaller number of more complex Intermediate Earth Orbit Satellites. These satellites orbit

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60 Ibid.

61 Stats developed by Datamonitor in Europe, source is: Paul Taylor, "From Blueprint to Reality," *Financial Times,* Telecommunications in Business (survey), Jun 5, 1994, p. VI.

62 These satellites orbit at 22,300 miles, high enough that they maintain position over a single spot on the Earth's surface. Lower orbit satellites move across the Earth; the lower the satellite, the quicker the horizon-to-horizon pass.

63 Taylor, "From Blueprint to Reality," p. VI.

64 Ibid.

at about 10,000 km and have a correspondingly lengthier pass time. Their disadvantage lies in the increased amount of power required to communicate with them. A drawback for Leos satellites is their largely untested status. Uncertainty in satellite lifetime will increase the risk assumed by satellite entrepreneurs.

The current leader of the pack, the Iridium project conceived by Motorola, aims to have a veritable constellation of small (1,500 lb) Leos satellites in orbit for its scheduled 1998 debut (see Figure II-6). Raytheon, Lockheed, Sprint, Bell Canada, and about 18 Japanese companies have climbed aboard. The estimated installed cost of the satellite and ground network: $3.4 billion. Iridium has already secured financing and this will likely give the company a commercial edge.

Globalstar, originally conceived by American defense contractor Loral, is striving to be a lower cost satellite alternative. For an estimated $1.5 billion, Loral will emplace 48 Leos and still achieve planet-wide coverage. Globalstar is backed by Alcatel, Alenia, Aerospatiale, and DASA.[65] Globalstar will save money by setting up and processing calls on the ground, as opposed to having digital switches in space. This not only simplifies the satellite network, it also makes use of cheaper ground-based communication carriers.

The Immarsat-P program aims to have a $2.4 billion network consisting of 12 to 15 Intermediate Orbit satellites operational by 1999 or 2000. Immarsat is a global satellite consortium with 69 member countries.

The most radical—and most expensive—is Teledesic, the dream of American billionaires Bill Gates and Craig McCaw. Teledesic, with its $9 billion worth of Leos satellites—840 of them at 435 mile orbits—is not a mobile system. Small receivers and antenna installed in homes or businesses will deliver high capacity voice, data, and video services worldwide by 2001.

Two important concerns may vex these elaborate plans. As ground-based mobile systems come down in price, the assumed mass market for Leos communication may disappear. A burst of worldwide landbased cooperation and standardization could make many of these expensive systems moot. In addition, sticky regulatory questions such as who should license and oversee a global satellite telecommunications service remain to be answered. One analyst estimates that the world market for calls by international travelers will be $8.9 billion by the turn of the century. But the satellite market will be closer to $600 million, largely because most travelers will be satisfied with slightly less convenient

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65 Haynes, "Scooping the Loop...," p. 16.

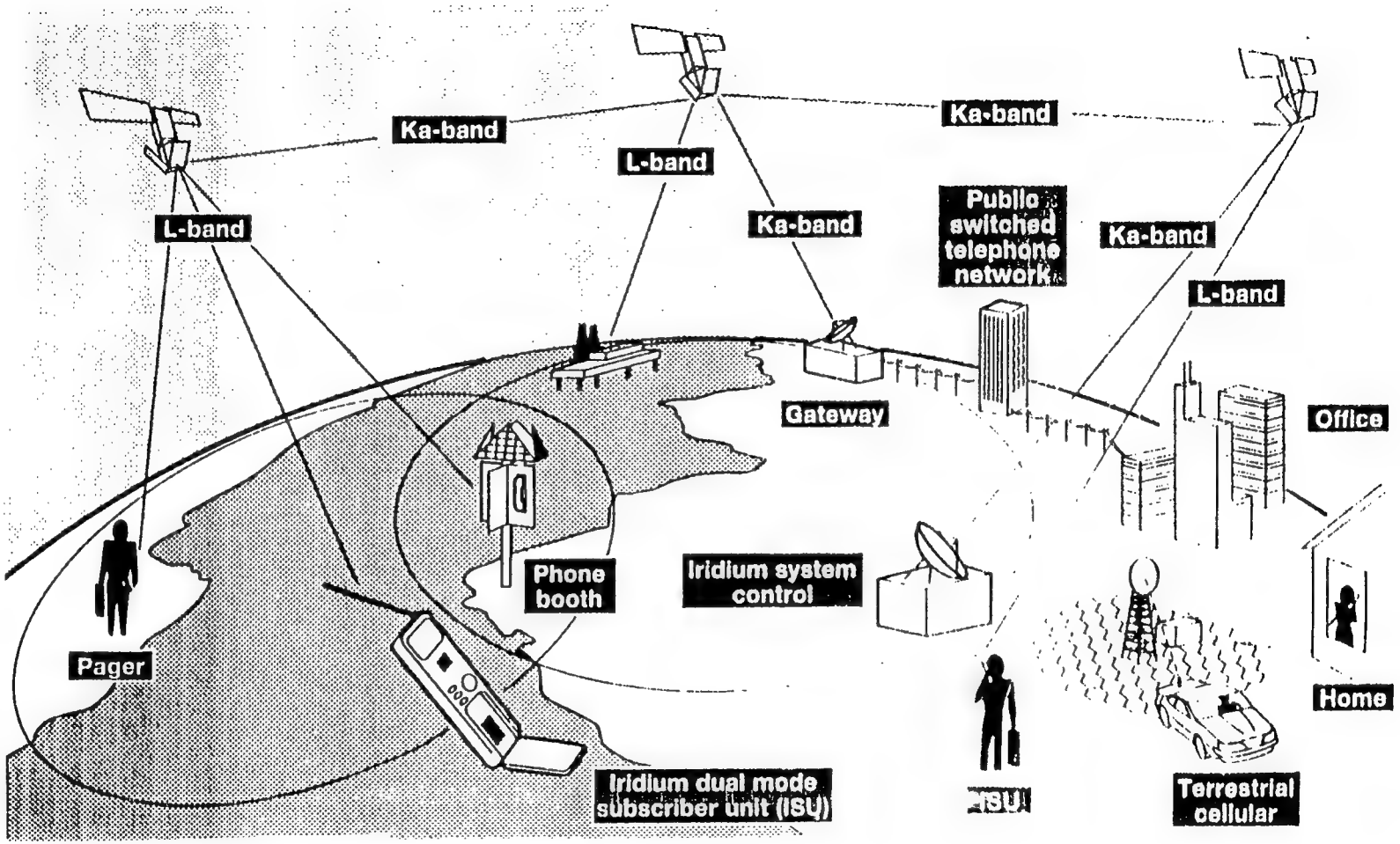


Figure II-6. Iridium System Overview

but much cheaper ways to communicate.[66] In the words of industry analyst Herschel Shostock, "more likely than not, personal communications satellite services are not viable. We place the chance of their success at one in ten or less.[67]

## C. EASTERN EUROPE

Joseph Stalin once rejected a plan to extend the Soviet Union's fledgling telephone network with the words: "I can think of no better agent of counterrevolution."[68] This line of thought, along with heavily bureaucratized and astoundingly mismanaged telecommunications providers, has been responsible for the paucity of the Eastern European telecommunications infrastructure. The planned economies of the Eastern nations failed on two major accounts. They failed to prioritize telecommunications services, both to consumers and businesses, and they failed to reinvest income in development projects. The result of subsidizing other parts of their economy with telecommunications revenue is a low density of lines per 100 people (see Figure II-7), and extremely long waits for service—as much as 10 years in Poland.[69] Startling statistics—to Westerners—abound; the upshot is a lack of infrastructure and a lack of domestic capital to finance infrastructure investment.

The acceptance of the market and the liberalization of telecommunications in Eastern Europe should seemingly provide a wealth of opportunity for Western firms. But though a number of firms are cautiously entering the markets, many are deterred by the absence of hard currency, and thus the possibility of a minimal return. The lack of guaranteed political stability has also kept more chary firms from investing. There is something of a catch-22 in operation in Eastern Europe: increased communication increases political and economic stability, but firms able to supply communication will not risk an unstable business environment.[70] A number of projects are under way, however, and it is likely that a steady pace of modernization will lift Eastern Europe from its decades-long well of stagnation.

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66 Ibid.

67 Ibid.

68 Peter O'Donnell, "Long-Distance Operators: The Baby Bells Invest Abroad," *Public Utilities Fortnightly*, Feb 1, 1993, p 29.

69 Andrzej Jajszczyk and Jerzy Kubasik, "Telecommunication Tariffs in Central Europe," *IEEE Communications Magazine*, October 1993, reference 1.

70 Peter O'Donnell, "Long-Distance Operators: The Baby Bells Invest Abroad," *Public Utilities Fortnightly*, Feb 1, 1993, p 29.

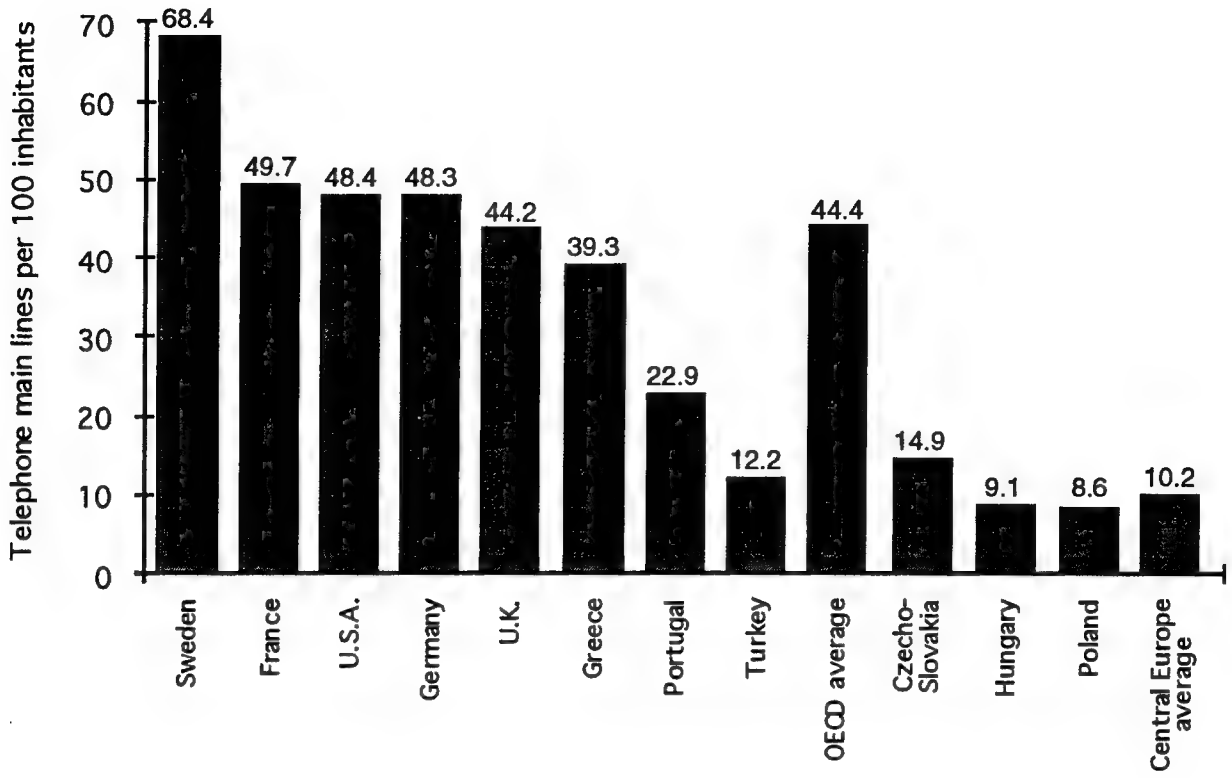


**Figure II-7. Telephone Main Lines Per 100 Inhabitants as of January 1, 1991**

Deutsche Telekom has recently laid the first segment of its planned 14,000 km fiber optic communication loop know as the Trans-Europe Line (TEL) that will eventually connect all of Eastern Europe, a number of the ex-Soviet Republics, Moscow, and Finland. Fourteen network operators, including all of the Eastern Republic operators, will eventually invest a total of $402 million.[71] Enthusiasm is high for the project, and a number of Western European carriers have acquired transmission capacity for their traffic to TEL countries.

Wireless communication may prove to be the technology most suited for immediate Western investment. The constant average cost of wireless technology mentioned earlier has provoked considerable wireless investment into Eastern Countries, and not one of the more stable East European states is without some form of wireless network.[72] Most users rely on wireless exclusively, shunning entirely the decrepit wired service. US West, which has been one of the biggest investors in Eastern European wireless, is currently finishing a

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71 Alfred Vollmer, "Deutsche Telekom to become Link to Eastern Europe," *Electronics*, v67, n2, January 24, 1994, p. 9.

72 Peter Haynes, "Scooping the Loop," *Economist*, v329, n7834, October 23, 1993, p. T14(3).

nationwide cellular network in Hungary. The partnership with Hungarian state provider Matav currently provides service to 30,000 customers, of whom 30% use cellular exclusively.[73] These networks will increase communication both between domestic businesses and between Eastern Europe and the outside world. Increased communication and increased economic ties will ensure stability, and this in turn will fuel further investment.

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73 Ibid.

# III. REGULATION

Efficient regulation of a system as complex as the European telecommunication network requires an understanding of politics, economics, and the law. The sections that follow apply economic theory to the complex intra-European and cross-Atlantic political relationships that have evolved relative to telecommunications regulation, with an emphasis on American business interests and the prospective socio-political-economic climate. The discussion focuses on three aspects of regulation: marketplace regulation, which includes a history of the major European Commission directives and focuses on the process of liberalization and the leading role of European regulators in dealing with issues internal to Europe; trade regulation, which focuses on trade in services and problems that competitive American firms face in negotiations with monopolist PTTs; and intellectual property regulation, which covers issues of standardization, including the impact of standard setting on American opportunities abroad.

## A. REGULATION OF THE MARKETPLACE

Regulation of the telecommunications marketplace in Europe reflects the political nature of a union of loosely tied nation states. These loose ties are in stark contrast to the high degree of cooperation necessary for installation and operation of a successful communication network. Leaders of the European Community, recognizing their relatively uncertain position in a murky sea of national loyalties and international pressures, have managed the Union gently, with an emphasis on cooperation and consensus. The leadership has striven to generate a regulatory methodology based on principles established through unilateral and pan-European agreement.[1] The *Green Paper on the Development of the Common Market for Telecommunications Services and Equipment*,[2] published in 1987, represented a major first step toward a Europe-wide telecommunications policy. This section summarizes the various papers and decisions and their effects on the process of European telecommunications liberalization.

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1 Mark T. Austin, "European Telecommunications Policy and Open Network Provision: the Evolution of a Regulatory Methodology," *The Fletcher Forum*, Winter 1993, p. 97(20).

2 European Commission, *Towards a Dynamic European Economy: Green Paper on the Development of the Common Market for Telecommunications Services and Equipment*, COM (87) 290. Brussels: June 30, 1987.

Telecommunications liberalization in Europe was and is no steady forward process. Because of the regulatory complexities and the issues of sovereignty, the direction and especially the specifics of regulation have been steered as much by individual court decision—so-called back-door regulation—as by EC generated directives[3]. For instance, the first firm government documentation supporting change in telecommunications was the *British Telecommunications* case of 1982.[4] The Commission decision, upheld by the European Court of Justice, held that British Telecom had abused its dominant market position in refusing to allow private value-added service companies to access its network infrastructure. The court specifically upheld European level competition law[5] over the property ownership rules of individual Member States.[6][7]

EC realization of the need for a European policy initiative was first achieved with the Green Paper. The EC questioned the PTT monopolies, and initiated a move toward liberalization and competition. But such a move had to be made carefully, with an eye toward maintaining forward progress and establishing the EC as the legitimate superior authority without unduly angering the PTTs and derailing EC efforts by poisoning the relationship between the EC and the Member States. A large part of the problem lay in the lack of effective separation within Member States of the PTT and its associated regulatory body. Close ties between a firm and its regulator, two entities with theoretically opposing agendas, can, and in the case of European telecommunications, do stifle competition.[8] Both Member States and PTTs have argued that monopolies serve to soften the public and workers against destabilizing technological advances and ensure that the benefits of advances are made available to all in the form of "universal coverage."[9] This public interest argument has never held up under investigation. The vast profits generated by the PTTs certainly indicate prices unsupported by cost issues.[10] These profits rise far above any outlay for subsidized universal coverage. Needless to say, private industry leaders objected to the market-dominating PTTs. The Green Paper attempted to begin a "common

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3 Colin D. Long, "Telecommunications: Reciprocity of Treatment and Parity of Licensing Practice Between the US and the UK/Europe - an Overview," *Computer Law and Practice* , v9, n6, 1993, p. 214.

4 *British Telecommunications.* OJ (L 360) 36, December 12, 1982.

5 *Treaty Establishing the European Economic Community,* Article 86.

6 Ibid., Article 222.

7 M. Veronica Pastor, "The Problem of International Accounting Rates: The European Commission Steps In," *Federal Communications Law Journal* , v45, n2, p. 318.

8 Deborah MacKenzie, "Europe Plans its Information Autobahn," *New Scientist,* Feb 26, 1994, p. 4.

9 Supra note 1, p. 99.

10 Hugo Dixon, "Reconnecting Charges and Cost," *Financial Times,* April 13, 1990, pp. 1, 20.

thinking process"—to establish a guide—for the path toward liberalization.[11] Balancing all the necessary agendas and moving forward at the same time was no easy task, and the Green Paper presents little in the way of specifics for liberalization. Its numerous recommendations can be summed up into three broad areas.[12]

First, the Green Paper assured the PTTs that they would continue to have a special place in the new market. Second, the Paper distinguished between basic and value-added service, and established basic telephony as the exclusive domain of the PTTs. Value-added services were to be steadily and briskly opened to competition. In addition, the equipment and services markets were to be open immediately to competition.[13] Finally, the Paper paved the way for EC implementation of the various recommendations. When the Member States accepted the Green Paper, they somewhat unknowingly accepted both a secondary status as regulators and a zealous pace of liberalization by the EC.

A series of crises followed a series of EC-issued Directives; the crux of the crises was the balance of power between the Member States, which were pressured by the PTTs, and the EC.[14] The upshot was a new Directive for Open Network Provision (ONP) that continues to be the basis for regulation of telecommunications in the European Community.[15] Essentially, ONP encompassed a set of principles that outlined broad conditions for use of the network and served, much as the less successful Green Paper was intended, as a launching point for future directives. Without detailing the specific directives, the followng paragraphs explain the major elements of ONP, and in doing so bring the reader up to date on the internal marketplace regulation of European telecommunications.

ONP was developed to promote efficiency and equity in access to the network. The conditions of use, as defined by individual Member States and their PTTs, would have to comply with three basic principles: basis in objective criteria (which refers to the supply and use of services), transparency (essentially well-published and available to the public),

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11 Supra note 2, p. 49.

12 Supra note 1, pp. 104-105.

13 Supra note 2, p. 14, also Figure 13.

14 Two in particular: a court battle between France, Germany, Belgium and the EC over the *Directive on Competition in the Markets in Telecommunications Terminal Equipment,* 88/301/EC, May 16, 1988. O.J. L131/73 (the fight was won by the EC). An secondly, objection to the *Directive on Competition for Telecommunications Services,* 90/388/EC, O.J. No. L 192/10, July 28, 1990. The objection didn't end in a court battle, but a new Directive, on ONP (see text of paper).

15 *Directive on the Establishment of the Internal Market for Telecommunications Services Through the Implementation of Open Network Provision,* 90/387/EEC, O.J. L 192/1. July 24, 1990.

and non-discrimination (which requires tariffs to be both uniform and cost-based[16]).[17] The ONP directive specifically delineated requirements for objective denial of access. These were spelled out to prevent stalling tactics on the part of the PTTs. ONP continued to maintain simple public voice telephony as the exclusive domain of the PTTs, and this created a terrain of conflict, mainly over questions of definition. The ONP directive drew a line, similar to the Green Paper's, between basic and value-added services.

The definition of value-added services is generally a point of contention although, without delving into specifics, only 10% to 15% of all telephony services by revenue could be considered value-added. While this figure indicates that the PTTs were the big winners of ONP, with their exclusive rights to 85% to 90% of telecommunications revenue, the closer look performed by DG XIII[18] demonstrated otherwise. The market for value-added services was (1989), and likely is, still growing at 36% annually, far more than the fairly traditional growth of basic services.[19] This growth parallels the increasing strategic importance of the value-added sector.[20] Clearly there is much at stake in the value-added sector, and aggressive entrepreneurs are continually pushing the limits of the definition, especially as regards the distinction between public networks, where competition is not permitted, and private networks, which are legitimate terrain of competition. For example, on April 11, 1994, a consortium of 30 European-based multinationals led by Xerox announced the award to British Telecom and AT&T of a massive project to build a virtual private network connecting all 30 companies to themselves and long distance carriers.[21] By leasing lines and creating a virtual private network that bypassed the local phone companies, the deal is considered by some to hail the de facto end of phone monopolies in the EU.[22]

As stated numerous times, telecommunication authority in Europe is shared by the EC and the Member States, and as a result of the ONP Directive, much action was required of the Member States individually to comply with the principles of ONP. Although each country has its own interpretation of what constitutes compliance and indeed how ONP

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16 Supra note 1, p. 111.

17 Nicholas Higham. "Open Network Provision in the EC," p. 242.

18 The Directorate for Telecommunications, Information Industries, and Innovation of the European Commission.

19 Scion Networks. *The Market for Value-added Services in Europe.* December, 1989. p. 13.

20 Supra note 1, p. 108.

21 Gail Edmondson, "Brave Old World," *Business Week: The Information Revolution*, Special 1994 Bonue Issue, p. 42.

22 Ibid.

should actually be implemented, some general principles can be distilled from Member State actions.[23]

The separation of regulatory and operational functions is of primary concern to Member governments. Powerful forces, including management of the PTTs, telecommunications unions, and interested legislators, all hold a certain amount of sway over this process. All of these forces can hamper the ability of the regulators, whose relatively new powers and offices do not have nearly the same authority and legitimacy as an institutionalized and entrenched regulator like the US Federal Communications Commission.

Secondly, many Member Countries are establishing consultative bodies organized to include all major telecommunications players in the country and intended to advise the telecommunications ministry.[24] This reflects the consensus approach taken by the EC: by relying on currently available socioeconomic infrastructure the governments seek a cooperative reform that will be speedier than a more combative approach that ultimately leads to delays and lawsuits.

Finally, countries are determining for themselves answers to the aforementioned definitional questions over public/private and basic/value-added. These distinctions create difficulties for integration of the European network as a whole, but strategies for bypassing Member State legislation may in the end create a de facto, private, and adequate pan-European network.[25]

Although the Green Paper and ONP, and their subsequent interpretation, represent the total of EC guidance on telecommunications, there are a few other noteworthy issues that specifically relate to the internal marketplace regulation of the Union. Note that the tariffs issue has not been specifically addressed in this section, but rather will be discussed in a later section on trade regulation. The issues addressed here cover concerns that exist, or will exist, mainly as a result of the communications revolution and the convergence of telephone and cable television. The old regulatory rules, wherein publishing was relatively unregulated, common carriers were regulated so as to provide non-discriminatory access, and broadcasters were regulated both on ownership and content, are quickly being trampled

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23 Jacques Arlandis. "Trading Telecommunications: Challenges to European Regulation Policies," *Telecommunications Policy* , April 1993, p. 175.

24 Ibid.

25 Ibid., p. 176.

by industries that defy such simple categorical definitions.[26] In many ways, deregulation and its accompanying competition would solve these problems, but the reality of monopoly and duopoly fiber networks in most regions does require a certain amount of regulation to ensure access. The trick is to find regulation that does not stifle competition while it creates incentives for network owners to be open to content providers, and the answer may lie in a new body of regulatory theory. A so-called postman-publisher regime would require network owners to allow non-discriminatory network access at uniform prices. In return, the network owners would be permitted to own content, something previously forbidden of common carrier operations.[27] This arrangement could mitigate regulatory difficulties, but, as is usual in the EC, effective transnational implementation would be problematic.

There is no doubt that the EC recognizes these problems. Martin Bangemann, industry commissioner under outgoing EC president Jacques Delors, recently released a report in which he and 19 other industry leaders—the "Bangemann Group"—recommended swift elimination of regulatory constraints that impair competition and continue to fragment the "unified" European market, as well as introduction of a European telecommunications regulatory authority that could implement the "minimum of new regulation" necessary for ONP compliance.[28] Roland Huber, Delors-appointed head of telecommunications research for the Commission, points to the lack of strategic alliances among European companies that are abundant in corporate America.[29] European PTTs face extreme cross-ownership restrictions, and cross-ownership may be critical to tearing down cross-borders restrictions and outrageous tariffs that hurt trade in telecommunications, and through reduction in communication, all trade.

## B. INTERNATIONAL TRADE REGULATION

The rising importance of information and intelligence, coupled with the growth of a truly global economy, has propelled issues of trade regulation in telecommunications to the forefront of government policy on both sides of the Atlantic. There is indeed much of

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26 Transforming the Telescreen," *Economist*, (Special supplement: A Survey of Television), v330, n2, January 24, 1994, p. 9.

27 Ibid.

28 Suzanne Perry, "Bangemann Group Proposes Info Highways Strategy," *Reuters*. June 1, 1994.

29 Debora MacKenzie, "Europe Plans its Inforamtion Autobahn...," *New Scientist*, February 26, 1994, p. 4 (2).

concern; the EU equipment market alone was worth $319 billion in 1994.[30] International trade in telecommunications is governed generally by the GATT,[31] which operates as a legal framework for trade relations, a forum for negotiations (through regularly convened Rounds), and an organ for the settlement of disputes.[32] The goal of recent GATT Rounds has been to attain an environment of liberalization and harmonization in telecommunications trade.[33] The EU internalization of recent GATT Rounds has been reflected generally in the Green Paper and the ONP Directive discussed above. Both of those documents, especially the ONP Directive with its focus on promoting open and efficient access to public networks, do govern international trade, but there is a wide disparity between the intentions of ONP and the Member States' trade practices. This section outlines the European Commission's objective in setting regulatory policy, and then details the complaints of market barriers that US firms allege.

The major EC concern is choice in communications. Choice is the sine qua non of competition, and competition is the goal of EC policy. The EC strives to ensure choice, but not at the expense of the competitiveness of European firms. It can be correctly stated that imposing choice while maintaining the integrity of the public network infrastructure is the essence of EC policy.[34] Most of the European telecommunications firms had a history of unique bilateral relationships between equipment suppliers and service providers. In the 1960s and 1970s, each individual country had its own standards, and monopoly PTTs had unique purchasing relationships with one or two incountry suppliers that specialized in the particularities of the national technology.[35] With the digital revolution, the needs of consumers and businesses changed rapidly, forcing governments and suppliers to cope with international demands, new and vigorous competition, and much more rapid innovation. In 1984, the EC Council of Ministers recognized the need for a Community-wide market in both telecommunications equipment and services.[36] The equipment market, depending as it does on standards and intellectual property laws, is discussed in a section

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30 European Information Technology Observatory (EITO), as read in Andrew Emmerson. Converging technologies offer commercial gain, *Financial Times,* June 15, 1994, p. XI, of the Financial Times survey: Telecommunications in Business.

31 General Agreement on Tariffs and Trade, Opened for Signature, Oct 30, 1947, 61 Stat. A3 A1365, TIAS No 1700, 55 UNTS 187.

32 Hamid Mowlana, "Toward a NWICO for the Twenty-First Century?" *Journal of International Affairs,* Summer, 1993, p. 127.

33 Arlandis, p. 172.

34 Ibid., p. 175.

35 Mowlana, p. 123.

36 Ibid., note 63, p. 125.

which focuses on intellectual property. It is on the market for trade in telecommunications services that I will now focus.

Currently, the only market sector open to competition is the value-added sector. Although the EC has set a January 1, 1998, deadline for the complete liberalization of telecommunications services, it is difficult to see how this goal will be attained. Most of the Member States still have close ties with their PTTs, many of which remain wholly or partially in government hands, despite the difficulty public firms have in raising capital, and the efficiencies to be gained from market capitalization. Without heavy capitalization these aging behemoths will have serious difficulty staying abreast of swift technological change. In fact, the monopolist PTTs are in something of a Catch-22 situation: they want to keep their monopoly and maintain their higher, uncompetitive prices; but in the long run this stagnation will be their downfall. Lean, competitive firms are awaiting the preordained end of monopoly provision of services and preparing to plunge into the markets with superior marketing and managing skills. British Telecom, operating in arguably the most liberal telecommunications market in the world, is one of the few PTTs to have adapted to competition, having successfully made the transition away from monopoly in the UK, where competition exists—unique (with Sweden) to Europe and the Western Hemisphere—in the local loop. Now British Telecom has expressed its desire for worldwide competition on all levels, local and long distance, and may be allowed to offer trunk telephone service in the United States if AT&T is to get permission to offer local service in the UK.[37] For the present, however, firms offering services outside their borders have to be satisfied with competition in the long distance market and the value-added market, the definition of which, as we saw in the earlier section on marketplace regulation, is open to wide interpretation.

Contracts for value-added services, especially in the large multinational corporate market, have been pursued vigorously by private corporations. There have been some recent developments in Europe and America among which is the success American firms have had in offering value-added services to European-based multinationals. Awards of European cellular licenses to the RBOCs[38] can be seen as European acceptance of greater American operating experience and marketing skills.[39] There continues to be a perception

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37 Ibid.

38 Regional Bell Operating Companies, the seven companies spun off Bell Telephone Company as a result of the 1982 Consent Decree.

39 Jens C. Arbuk, "The European Revolution of Wireless Digital Networks," *IEEE Communications Magazine*, v31, n9, p. 76.

among American companies that the European market is closed to them—that there exists a "Fortress Europe" in telecommunications—and this perception must be addressed.[40]

Firms and citizens alike base judgments on their native experiences. Because the United States was unique in having a private telecommunications network from the start, US companies tend to judge the public and protected European environment as difficult and closed. The tight restrictions which have allowed Europe to fall a decade behind the United States in terms of penetration of computers into homes have also infected all aspects of technological trade.[41] Member State governments, instead of trusting the invisible hand of the marketplace, inserted their much heavier hand and were responsible for failure after failure. Because of the importance of phone companies, the PTTs were not allowed to fail; indeed they also faced no competition and forced local rates onto consumers ranging from two (Germany)[42] to ten (Greece)[43] times those in America. The problem with operating in Europe stems largely from the past incompatibility of Member States' networks, and the complex web of loyalties, tariffs, and regulations. But this is changing as the EC gains power, and standardization and deregulation sweep the telecommunications industry. The EC Directives build on the authority of the Treaty Establishing the European Economic Community,[44]and the Treaty specifically describes the freedom to provide services as being "without prejudice" under "the same conditions as are imposed by that state on its own nationals."[45] The only legitimate restrictions are on grounds of public interest, and the EC has specifically stated that since none of the value-added services are connected with the special rights of sovereign states,[46] there can be no restrictions on grounds of public health.[47] Although incidence of de facto regulatory holdups may occur, these should generally become more and more rare as governments and newly appointed ministers grow used to the new rules.

A real concern for American companies, and recently for the EC, is the massive trade imbalance in long distance fees due to market power advantages the European

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40 "Fortress Europe," *The Transnational Lawyer*, Vol. 6, p. 113.

41 Penter Fuhrman, "Here We Go Again," *Forbes*, June 6, 1994, p. 98.

42 Local phone statistics from Tarifca/Omnicom PPI Ltd.

43 For info on Telecom in Greece, see Natasha Constantelou. Liberalizing Telecommunications Markets: Political externalities in the Greek Case, *Telecommunications Policy,* August 1993, pp. 431-445.

44 Mowlana, note 5, p. 114.

45 Ibid., 180, p. 145.

46 That is, the coercive use of force to protect citizens, etc.

47 Mowlana, note 189, p. 146.

monopolists have over competitive American carriers (see Figure III-1). Because a long distance call passes through infrastructure owned by at least three different companies—

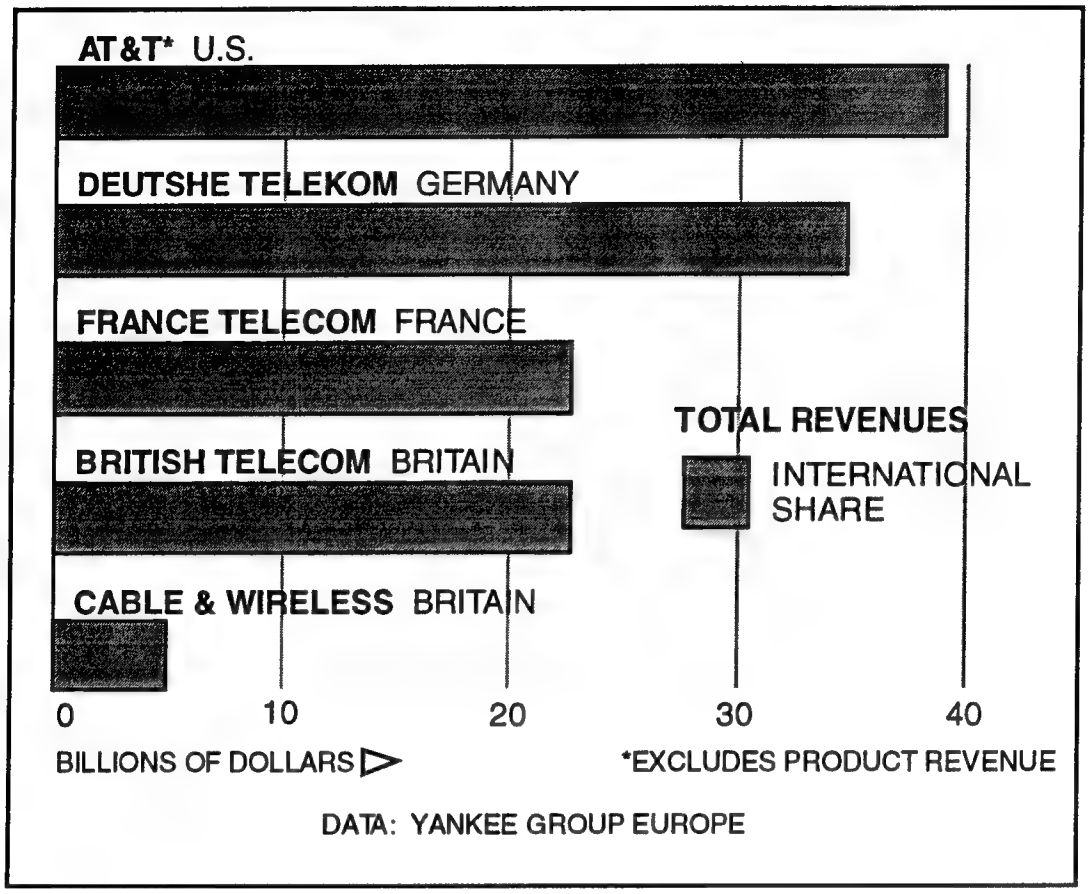


**Figure III-1. The Top Players in Overseas Calls**

your local company, your chosen long distance company, and the receiver's local company—there is an exchange of fees that are negotiated by all companies involved. The problem with US–EU phone calls lies in the negotiation of fees, called accounting rates, between the PTT and the US long distance carrier. Although accounting rates are supposed to be established by mutual agreement and should reflect issues of cost,[48] the monopolistic European PTTs have massive bargaining power compared with the competitive US companies. Since a PTT will choose a long distance carrier for calls originating from its home country based on the profit motive, it is in each "American carrier's best interest to offer to pay high prices," or accept lower fees, "for greater concessions."[49] Moreover, US

48 Pastor, p. 314.

49 Ibid.

carriers face market pressures which make it difficult for them to pass on higher fees to customers, whereas PTTs face no such pressure and can set consumer charges arbitrarily.

The net result of this unequal relationship is a telecommunications trade imbalance of more than $3 billion annually.[50] Higher phone rates for Europeans also result in an inefficiently small number of overseas calls. Although the Federal Communications Commission has noted the complaints of American long distance carriers and has issued a Report and Order suggesting that a cap on accounting rates could be mandated if a more equitable arrangement is not negotiated, little has occurred to correct this chronic problem.[51]

Though the EC has also spoken much of this problem, it, too, has taken little action. With the economic downturn of the past few years the EC has become more protectionist, and the incoming administration is unlikely to force PTT change.[52] As economic theory would predict, only a change in the structure of the European marketplace–essentially the introduction of competition into local telephony—will solve the accounting rates problem.

One last area worthy of mention is trade in content. American content—the immense amount of TV programming produced in the United States each day—has long been prevented from unlimited dissemination in Europe by content quotas that required stations to carry a majority of European-originated programs. Such rules were intended to protect European culture and to nurture indigenous industry. American firms have long argued that quotas serve as artificial barriers to competition that hurt both companies, including European stations that could profit from American programming, and consumers, who are hurt by a lack of choice. These quotas will likely soon end. Martin Bangemann, telecommunications industry commissioner, described content as entertainment, and entertainment as an economic good. Reinhard Buscher, a member of Bangemann's commission, spoke at a conference about the explosion of new technology, including video-on-demand services, that made quotas obsolete. He stated that measures specifically

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50 Ibid., note 9 p. 315.

51 Ibid., note 10, 11, p. 316.

52 Interview, August 4, 1994, with M. Veronica Pastor, Telecommunications Lawyer at Fletcher, Heald, & Hildreth and author of "The Problem of International Accounting Rates," from which this section has drawn heavily.

tailored to support European film and television industry made more sense than quotas, which merely bottleneck the distribution industry.[53]

## C. INTELLECTUAL PROPERTY RIGHTS AND TRADE IN TELECOMMUNICATIONS EQUIPMENT

Standardization plays an ever more important role in the European Union as Member States and telecommunications operators strive for interconectivity while pushing the technology envelope. The conflict between intellectual property rights (IPRs) and standardization can determine the future level of innovation and hence the long-term competitiveness of firms that abide by EC and Member State IPR laws. Trade in telecommunications equipment is also highly dependent upon standards agreements. To understand the nature of the conflict, one must examine economic theory on the subject.

It is an underlying economic assumption that the public interest is best served by conferring on entities "the maximum freedom to determine their conduct in the marketplace."[54] Intellectual property laws are an essential part of the minimum marketplace regulation necessary to ensuring that market position is neither abused nor otherwise manipulated. The laws allow firms to get full measure for innovation. Standardization, especially when it involves compulsory licensing, implicitly assumes that the purpose of IPRs is to adequately reward innovation, but this assumption ignores the economic tenet that freedom for the firm must be the bottom line. The argument finishes: let the firm determine if the profits of licensing rights are adequate to offset the loss of those exclusive rights.[55]

Proponents of standardization also have compelling arguments. A lack of interconnection due to overprotection of IPRs can also lead to inefficiency because of economies of scale in research. A company with no hope of sales to the customers throughout the entire pan-European network may be forced to forgo research opportunities that would themselves prove innovative. Without a standard to establish compatibility protocol, manufacturers face limitations on product line development.[56] In addition, since telecommunications systems are extremely complex, it is unlikely if not impossible for all

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53 Raymond Snoddy and Emma Tucker, "EU Takes a Softer Line on US Media," *Financial Times,* July 13, 1994, pp. 1, 18.

54 David R. Barrett, " *EC Policy on Intellectual Property and Standardisation - The Impact on the Computer and Telecommunications Industries,*" Computer Law & Practice, v9, n2, p. 47.

55 Ibid.

56 Cesare Mossotto, "Pathways for Telecommunications: A European Outlook," *IEEE Communications Magazine*, August, 1993, p. 54.

possible innovation to be resident in the first generation of a large system. Compromise and release of IPRs can then lead to faster access to the market for future innovation and permutations of products and services (see Figure III-2).[57] Intelligent networks with a centralized layer containing the service execution logic—networks that require universality and hence standards to be effective—can allow innovators to more quickly install new services such as universal personal telecommunications, a feature that would assign each individual, rather than each location, a personal phone number.[58]

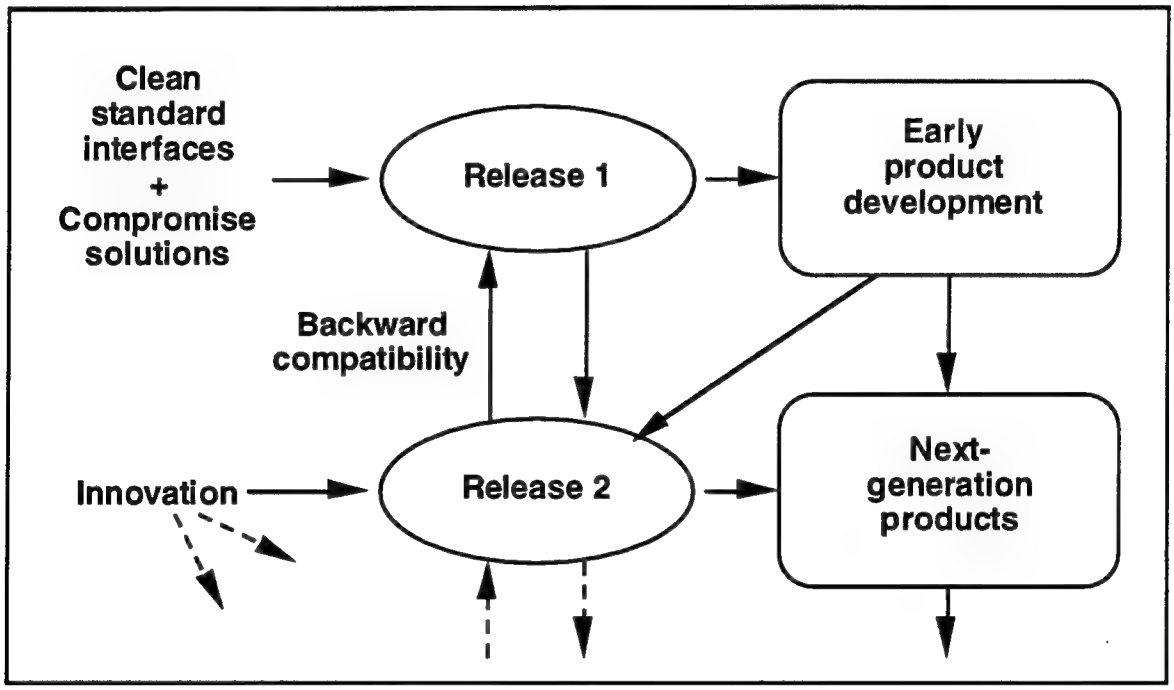


**Figure III-2. Development of Standards: The Release Approach**

The ONP Directive sets the stage for the evolution of European Union IPR policy. Some degree of standardization is necessary to achieve harmonization and transparency on issues of technical interface and interconnection.[59] Open network concepts are intended to ensure functional continuity while avoiding abuse of dominant positions on interoperability

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57 Ibid.

58 Arbuk, n9, p. 75.

59 Alain Vallée, "The Europe of Telecommunications in a Service Economy," *Global Trade*, IDATE, 1989.

questions.[60] To satisfy the need for standards the EC created the European Telecommunications Standards Institute (ETSI) in 1988. The ETSI is an semi-open body with members from the government, industry, and research sectors.[61] The ETSI does not accept full members from anywhere other than geographic Europe, a sticking point with American companies who understandably feel shut out of negotiations over standards that will certainly have a global impact.

Although attempting to paint the issues of standardization in black and white washes out genuine subtlety, it is probably safe to say that the ETSI is pro-standard and that the EC is more conservative and protective of IPR. The Court of Justice, when applicable, has generally also been protective of IPR. The ETSI released its Intellectual Property Rights Policy and Undertaking, detailing its position which was essentially that IPRs had to be sacrificed for standardization, and that compulsory licensing would be the policy of the ETSI.[62] While an analysis of this debate is complicated and requires an understanding of the legal requirements of standards setting bodies, most observers hold that the Policy and Undertaking are anti-IPR and most likely violate the European Court of Justice interpretation of Article 86 of the Treaty of Rome, which legislates strong protection for IPR holders and allows restriction of IPR freedoms only under exceptional circumstances.[63] The EC, in its Communication on IPR and Standardization[64] of October 1992, took a position close to Court of Justice rulings. The EC also used some of the economic arguments mentioned above to warn of the long-term dangers of compulsory licensing. Generally, the only approved situation that would allow the ETSI to force licensing is one in which a firm is abusing its dominant position, and the Court of Justice has specifically stated that "a refusal to grant such a license cannot in itself constitute an abuse of a dominant position."[65] Since the final word rests with the court system, it may be that IPR holders will find ultimate protection in the Court, should the ETSI become overzealous in its quest for standardization.

The ETSI, as Europe's telecommunications standards body, has a tremendous effect on the ability of American firms to sell equipment overseas. As the European market

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60 Arlandis, p. 179.

61 Mossotto, p. 54.

62 Prins, Corlen and Martin Schiessel, "The New European Telecommunications Standards Institute Policy: Conflicts Between Standardisation and Intellectual Property Rights," *EIPR*, v8, p. 263.

63 See Corlen Prins and Martin Schleissl, also David Barrett.

64 "Communication from the Commission, Intellectual Property Rights and Standardization," COM (92) 445 final Brussels, October 27, 1992, at 5.1.15.

65 *Volvo v Veng*, 238/87, (1988) ECR 6211, at 6235.

becomes liberalized, it is growing in ways the United States already has; this means that large American firms such as the cash cow Baby Bells, which are looking for expansion opportunities, are often interested in the European equipment and networking market, a market that accounts for 25% of world wide equipment sales.[66] The ETSI, in setting standards, effectively determines for foreign companies the compatibility, and hence the salability, of their products. Although the ETSI was earlier described as semi-open because it does not permit foreign representatives to join as full members, it does allow certain non-European experts to observe meetings.[67] Their influence and the equability of this arrangement is open for debate, but there are, in fact, international telecommunications standards bodies,[68] and the EU does conform to existing and negotiated international standards.[69]

The major concern of foreign firms is that their equipment, already tested at considerable expense in the United States, will have to be tested by additional European bodies that don't recognize US testers as "notified bodies." What the US government truly fears is that the EC will use its leverage in this area to demand trade concessions that go beyond what is necessary for consumer protection.[70] Though this attitude is mistaken with regard to EC standard setting, the US government is right to fear trade reprisals because US procurement policy is less liberal than policy the EC has recently mandated for the European Union. To understand these attitudes one must examine recent EC policy and the public procurement regulations of both governments.

The EC has generally tried to use consensus tactics until a prescriptive solution proves absolutely necessary. This is also true with regard to standards. While the EC has laid down guiding principles for overcoming the traditional country-based schemes, it has generally rejected mandatory standards in favor of voluntary conformance guidelines.[71] The EC has left mandatory standards to areas of essential public interest, and while there is still a gray area surrounding the definition of "essential," the EC remains dedicated to openness as part of its adoption of ONP.[72]

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66 Peter O'Donnell, "Long-Distance Operators: The Baby Bells Invest Abroad, *Public Utilities Fortnightly*, v131, n3, February 1, 1993, pp. 27-29.

67 "Fortress Europe," *The Transnational Lawyer*, Vol. 6, note 102, p. 131.

68 International Standards Organization (ISO), International Electrotechnical Commission (IEC).

69 "Fortress Europe," p. 131.

70 Ibid., note 103, p. 131.

71 Mossotto, p 55.

72 Nicholas Higham, p. 242.

EU procurement policy, as stated above, is more liberal than US policy. Thus EU has been harshly critical of 'Buy America' statutes in US public procurement legislation.[73] And, because telecommunications networks in the United States are privately owned, EU countries who feels discriminated against have little recourse under US law; US lawmakers have staunchly refused to mandate any sort of procurement fairness for private US companies.[74] In contrast, the PTTs of the Union are publicly owned (though this is changing slowly) and must obey the EC's 1990 Directive[75] that established rules for public procurement which require contracts to be awarded solely on economic grounds.[76] Article 29 of the Directive does have a sticking point for US negotiators: any tender may be rejected if greater than 50% of the products originate in non-EU countries. Non-EU countries have no access to the same types of remedies relating to non-discrimination, and negotiations culminating in an agreement were scheduled for sometime in 1994.[77]

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73 Colin D. Long, "Telecommunications: Reciprocity of Treatment and Parity of Licensing Practice Between the US and the UK/Europe - an Overview," *Computer Law and Practice*, v9, n6, 1993, p. 213.

74 Ibid.

75 Council Directive, 90/531/EEC.

76 "Fortress Europe," p. 132.

77 Long, p. 214.

# IV. CONCLUSION

Everyone would like to be able to accurately predict the future. It is human nature to forecast trends from present knowledge. We all synthesize and analyze with an eye towards understanding what tomorrow holds. Those who risk fortunes to corner an anticipated future market risk losing their stake; such a loss affects countless workers in countries around the globe. Yet economies do not stagnate. Successful augurs can reinvent society with brilliant and revolutionary techniques that create new markets and new opportunities for discovery of the next generation of products and services. Communication is a field that affects all others, and revolutions in communications have profound effects that multiply across all disciplines. The technologies described and the trends illustrated in this paper will all serve to fuel thought of future possibilities. It is hoped that interdependence will breed cooperation, and cooperation will open a new world of possibilities that 5 or even 10 billion members of the human race can share in equity and peace.

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Technological and infrastructural developments will make pan-European interconnectivity a reality in the coming decade. New fiber-optic, wireless, and satellite technology, as well as the burgeoning and much-vaunted information superhighway, will all contribute to the increasing sophistication and simplicity of voice, video, and data communication. Recent developments in Eastern Europe demonstrate the thesis that increased communication and increased stability spiral upwards together. Regulation is tied intimately to progress in telecommunications. Political wrangling and the directed actions of interested parties such as unions, regulators, legislators, and business executives have a tremendous effect on the implementation of new technology. Global technology standards will be determined largely by governments that act quickly to interconnect across large markets. Intellectual property rights regulation must provide a balance between establishing standards and providing incentives for continued innovation. Although market forces will largely determine future trends in telecommunications, effective regulation will be a prerequisite to interconnectivity, innovation, and growth.

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